Indian Institute of Foreign Trade

SURVEY of INDIA'S EXPORT POTENTIAL of FRESH AND PROCESSED FRUITS AND VEGETABLES

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SURVEY
OF
INDIA'S EXPORT POTENTIAL
OF
FRESH AND PROCESSED FRUITS AND VEGETABLES

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PART A

FRESH FRUITS AND VEGETABLES

GENERAL

REVIEW OF HORTICULTURAL DEVELOPMENT IN INDIA

Major Fruit and Vegetable Crops

The Survey conducted in 1961-62 by the Directorate of Marketing and Inspection places total production at 17.68 million tonnes comprising 12.18 million tonnes of fruits and 5.50 million tonnes of vegetables*. Mango is the most important fruit crop with an estimated production of 7.0 million tonnes in 1961-62, followed by bananas (2.67 million tonnes), citrus (1.21 million tonnes) and guava (656,000 tonnes). Although temperate fruits together accounted for only 112,000 tonnes, the range is fairly wide including apples, pears, plums, peaches, apricots, cherries and different berries. On the vegetables side, potatoes (2.77 million tonnes), onions (1.12 million tonnes) and tomatoes (465,000 tonnes) constitute the three major crops. Other vegetables grown in the country include cole and root vegetable crops like cauliflowers, cabbages, carrots, peas, beans etc. Detailed statistics of production, acreage etc. appear at Annexure A-18.

Review of Horticultural Development Plans

Planned development of horticulture gained real significance only in recent years. Development work during the First Plan (1951-56) was limited mainly to strenthening the research base of the horticultural sector. The Second

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*Area and Production Statistics given in this Volume are taken from the Directorate of Marketing and Inspection, Nagpur.

Plan (1956-61) witnessed the beginning of the promotion of horticultural development on an extensive basis. The State Plans included various schemes for the expansion of fruit production and a sum of Rs 50 million was allocated for this purpose. As a result of these efforts, an additional 288,000 hectares was brought under fruit cultivation and 190,000 hectares of existing orchards were renovated and expanded. In addition, certain specific activities aimed at supporting expansion of fruit cultivation were initiated which included the training of 5,000 gardeners in the techniques of improved farming. The achievements of the Second Plan, however, were not considerable and a major part of the programme was carried over to the Third Plan period (1961-66).

The scope of the development of fruit crops in India was significantly broadened during the Third Plan period and a number of basic activities were initiated. In addition, a few supporting schemes aimed at efficient marketing and storing operations were launched during this period. Special importance was attached to the development of major export oriented fruits like apples, oranges, bananas, grapes and pineapples. A new edge was given to the vegetable production in the country including

the intensive development of vegetable cultivation in the vicinity of large cities and industrial towns, aimed at increased production of certified seeds of potatoes and other important vegetables. The total outlay on this scheme was estimated at Rs 4.7 million. At the beginning of the Third Plan, the total area under vegetable was around 2.1 million hectares, which was proposed to be increased by about 31,000 hectares during the five-year period under this scheme. Achievement during the Third Plan, however, was not upto expectations as may be seen from the details given in the table below:

	Scheme	Target for Third Plan	Achievement upto 1962-63
1.	Fruit Development		
	(a) New orchards (thousand acres)	337	128
	(b) Renovation of old orchards (thousand acres)	530	131
2.	Training of gardeners (Nos)	5,260	1,359
3.	Establishment of Progeny Orchard-cum-Nurseries (Nos)	39	28
4.	Setting up Garden Colonies	50	2

In order to accelerate the tempo of development, a special 'crash programme' was launched in 1964-65 which was continued in 1965-66. The accent in this programme was on intensive production of vegetables and quick growing fruits in specially selected areas. For the purpose of implementing the scheme, the State Governments were financially assisted to a tune of Rs 6 million by the Central Government. Progress achieved under this programme is detailed in Annexure A-2.

Approach to the Fourth Plan*

The need for selective approach in the development of horticulture has been recognised and finds reflection in the schemes drawn up for implementation during the Fourth Plan period. A specific scheme for the development of fruit production for export purposes has also been included. A total outlay of Rs 50 million has been suggested for carrying out the contemplated schemes of the Fourth Plan, details of which appear at Annexure A-3. It is expected that as a result of implementation of the various schemes, area under cultivation will go upto 1.66 million hectares in the case of fruit crops and 1.62 million hectares in the case of vegetables. Total

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*A Revised Fourth Plan is expected to be finalised by the end of 1968. Details given in this Section pertain to an earlier Draft Fourth Plan outline which was formulated in 1965-66. Some of the developmental programmes included in this Draft Plan area, however, being implemented through annual programmes, pending finalisation of the revised Fourth Plan.

production of fruits and vegetables is envisaged to increase to about 32 million tonnes by the end of the Plan period. Ancillary facilities relating to transportation, marketing, cold storage and grading of fruit and vegetable crops are sought to be improved to meet the requirements of increased production envisaged under the Plan. Some of the major schemes included in the Fourth Plan are briefly discussed below:

Development of Fruit Production: Under this scheme, which was initiated during the Second Plan, total area under fruit cultivation was proposed to be raised from 1.11 million hectares at the beginning of Second Plan to 1.62 million hectares by the end of Third Plan. It has been proposed that during the Fourth Plan new orchards would be planted to the extent of 243,000 hectares. A provision of Rs 180 million has been made for meeting the long term loan requirements of the fruit growers and Rs 38 million for short term loans to be made outside the Plan. The scheme includes various facilities covering grant of loans @ Rs 740/- per hectare in the plains, and Rs 1,240/- per hectare on the hills. It is also envisaged that short term loans @ Rs 160/- per hectare would be provided for rejuvenation of old orchards, outside the Plan.

Scheme for augmenting fruit production in favourably situated areas for the commercial cultivation of apples, sweet oranges, bananas, pineapples, mandarins and acid limes: The scheme aims at promoting rapid expansion of area under these fruits in such places which are favourably situated in respect of the cultivation of these crops. Facilities proposed to be offered under the scheme are listed at Annexure A-4.

Scheme for the development of fruit production for export purposes: The scheme is aimed at expansion of production of those fruits and vegetables which have adequate export potential. These include bananas, citrus, mangoes and pine-apples. Under this scheme, an attempt will be made to commercialise production of selected varieties of these fruits for export markets. Facilities to be provided under this scheme include supply of plant protection service (disease and pest control measures) on a large scale and long term loans to the growers including Rs 4,940 per hectare for bananas and Rs 1,235 per hectare for pineapples. Pro-vision has also been made for the purchase of cold storage vans for safer transportation of these perishable items. The scheme will cover an additional area of 2,900 hectares for selected items.

The other schemes proposed to be implemented furing the Fourth Plan period include training of gardeners

in the modern techniques, establishment of garden colonies, setting up Orchard Development Corporation of India, establishment of progeny orchard-cum-nurseries, financial assistance to private and co-operative organisations for promoting horticulture cultivation, establishment of a national hortoria and development of vegetable production.

Research Programmes during the Fourth Plan

Alongside the development schemes, attention is being paid to strengthen the research base relating to horticulture in the country. At present, programmes of research are formulated by the Indian Council of Agricultural Research (ICAR), in consultation with the State Governments, and are implemented through Indian Agricultural Research Institute (IARI) and its sub-stations and research centres of the concerned State Governments. The State Governments on their own also carry out certain research programmes in the research stations run by them. The need for organising research on an integrated and coordinated manner was keenly felt by the Central Government in order to mobilise the available resources to the maximum advantage on the one hand and introducing selective approach in undertaking and solving the research problems on a pre-determined priority basis on the other.

In keeping with this objective, a Coordinated Research Project has been drawn up by ICAR to cover major fruits like bananas, citrus, pineapples, mangoes, guavas, papayas and apples. Similar programmes have also been drawn up for vegetable crops such as tomatoes, peas, beans, cauliflowers and root crops like potatoes. The research activities contemplated in these programmes include:

i) Improvement of varieties by selection and hybridisation

ii) Standardisation of agro-techniques

iii) Testing of growth regulators

iv) Experiments on pre and post harvest physiology

v) Cyto-genetical studies

The total outlay for the above scheme has been tentatively estimated at Rs 30 million. The names of centres/crops which fall within the purview of this Coordinated Research Programme are given below:

Centres/Crops Selected for 'Coordinated Research Programme'

Mangoes	Papayas	Bananas
IARI, Delhi	IARI, Delhi	Tiruchirapally, Madras
Hesarghatta, Mysore	Hesarghatta, Mysore	Chinsuda, West Bengal
Malda, West Bengal	Poona, Maharashtra	Savada, Maharashtr
Poona, Maharashtra	Coimbatore, Madras	Trichur, Kerala
Basti, Uttar Pradesh		Hesarghatta, Mysor

Citrus	Vegetables & Chillies	Pineapples
Gonicoppal, Mysore	Ludhiana, Punjab	Trichur, Kerala
Srirampur, Maharashtra	Katavam, Himachal Pradesh	Jalpaiguri, West Bengal
Hissar, Haryana	Kanpur, Uttar Pradesh	Kahikutli, Assam
Kodur, Andhra Pradesh	Poona, Maharashtra	Hesarghatta, Mysore
Abhor, Punjab	Hesarghatta, Mysore	
Katol, Maharashtra	IARI, Delhi.	

Grapes	Apples	Guavas
Poona, Maharashtra	Mashobra, Himachal Pradesh	Basti, Uttar Pradesh
IARI, Delhi	Srinagar, Jammu & Kashmir	Hesarghatta, Mysore
Coimbatore, Madras	Kulu, Himachal Pradesh	Poona, Maharashtra
Hyderabad, Andhra Pradesh	Chaupatia, Uttar Pradesh	
Hesarghatta, Mysore		
Ganga Nangal, Rajasthan		
Kalpavel, Himachal Pradesh		

The Government of India has recently set up the Indian Institute of Horticulture in Bangalore for intensifying research on a continuing basis on fundamental problems. Another notable development in the organisation of horticultural research relates to entrusting of research activities at the State level to the agricultural universities, wherever they are established. In consonance with this

policy, agricultural universities in Punjab, Himachal Pradesh, Andhra Pradesh and Mysore have already taken over the research functions.

Export Orientation

India exports only a negligible proportion of its production of fresh fruits and vegetables. India's exports of fresh fruits and vegetables, amounting to 110,000 tonnes valued at Rs 49 million in 1967-68, represent but an insignificant fraction of the total production of 20 million tonnes in the country. Onions are by far the most important item accounting for as much as 90% of the total exports. The balance is represented by a large number of fruits and vegetables including bananas, mangoes, oranges, lemons and limes, other citrus fruits, apples, grapes and pineapples. No organised effort aimed at systematic introduction of these items into the growing markets of Western Europe has ever been made, except for certain casual attempts.

As stated earlier, it is only in the Fourth Plan that development programmes for gearing up the horticulture industry towards exports have been contemplated. Even these schemes mainly relate to maximising production of certain selected fruit crops and do not provide for any positive plan of action for canalizing this production for export.

SPECIAL DEVELOPMENT (CRASH) PROGRAMME FOR HORTICULTURE

State/Scheme	Physical targets fixed for 1964-65 & 1965-66	Physical targets achieved by the end of March, 1966	Remarks
(1)	(2)	(3)	(4)
1. ANDHRA PRADESH			
i) Intensive production of vegetables and quick-growing fruits in selected cities	3,036 hectares	2,986 hectares covered under vegetables and fruits; 125 tons of fertilisers and 47 tons of pesticides distributed; 516 hectares brought under plant protection measures.	The scheme was completed during 1965-66.
ii) Establishment of Banana progeny orchards	15 hectares	16 hectares covered under progeny orchards of bananas, suckers also supplied to cover an additional area of 14 hectares.	Scheme being continued during 1966-67 as State Plan Scheme.
iii) Potato Development Scheme	283 hectares	288 hectares covered under potatoes.	The Scheme was completed during 1965-66.
2. MADRAS			
i) Development of potato cultivation, Kodai-kanal	i) New Area under potatoes 405 hectares ii) Existing area under improved methods 405 hectares	i) 519 hectares of new area covered. ii) Existing area of 1007 hectares under improved methods. Special compaign against late-blight disease conducted and crops saved in an area of about 891 hectares 1280 kgms of fertilizers and pesticides	Scheme included in the State Fourth Plan

Contd....

(1)	(2)	(3)	(4)
		distributed. Seed potatoes are being multiplied in the State Seed Farms at Kodaikanal.	
ii) Fruit Production for export purposes	2,429 hectares	2,917 hectares covered under bananas. Plant protection measures carried out on 1,764 hectares. Improved agronomic practices undertaken on 289 hectares.	Scheme included in 4th Plan. A target of 4,858 hectares has been fixed for each year.
iii) Vegetable Seed Production	6 hectares	6 hectares covered	Scheme included in 4th Plan with a target of 6 hectares for each year.
iv) Intensive production of vegetables & quick-growing fruits in selected areas	i) Seeds- 400 kgms. ii) Existing area under improved methods- 486 hectares	i) 1085 kgms. seeds produced. ii) 549 hectares cultivated under improved method. 655 hectares brought under vegetables.	Scheme merged with State Government's own Scheme and being continued during 4th Plan.
v) Increasing production of vegetables in hills of Madras	Seeds - 200 kgms. Fertilisers - 405 hectares. Pesticides - 202 hectares	2579 kgms. of seeds produced, fertilizers supplied for 459 hectares; pesticides supplied for 565 hectares.	Scheme being continued as State Plan Scheme in 4th Plan.
vi) Intensification of production of fruit plants	30,000 plants	16,155 improved fruit plants distributed	Scheme being continued as State Plan scheme. Target 30,000 plants per year.

(1)	(2)	(3)	(4)
vii) Fruit preservation unit at Madras	The scheme was not implemented by the State Government and they have proposed not to implement the scheme till suitable trained hands are available.		
3. MYSORE			
i) Intensive production of vegetables and quick-growing fruits	1,012 hectares	1,677 hectares covered under fruits and vegetables; 1,525 kgms. of fertilisers and 1087 kgms. of pesticides distributed; 247 hectares brought under plant protection.	Scheme continued during 1966-67, as State Plan scheme.
ii) Increasing fruit production for export purposes	162 hectares	101 hectares brought under Coorg Mandarin Oranges. Two insulated vans purchased and being used for transport of fruits.	-do-
iii) Fruit production in specially selected areas	385 hectares (Banana 202 hectares; Grapes 91 hectares; pineapple 91 hectares)	536 hectares covered (364 hectares under banana; 121 hectares under grapes; 51 hectares under pineapple)	-do-
iv) Cultivation of vegetables after paddy harvesting in selected centres, in river-beds and in tank-beds	3097 hectares (729 hectares in fields after paddy harvest; 1215 hectares in river-beds; 1,154 hectares in tank-beds)	3,300 hectares (607 hectares in fields after paddy harvest; 1,559 hectares in riverbeds; 1,134 hectares in tank-beds).	-do-

(1)	(2)	(3)	(4)
v)(a) Production of disease free-potatoes at Potato Seed Multiplication Centre, Ooty	To Produce disease-free seed potatoes and good temperate vegetable seeds	One Seed Farm established. Vegetable seeds like radish Knolkhal, cabbage and beans have been produced and multiplied. Potato crop produced was found affected by Golden Nematode and therefore its multiplication postponed.	Scheme continued during 1966-67 as State Plant Scheme.
(b) Establishment of Seed production and multiplication centre at Hassan	To produce disease-free seed-potatoes	Cultivation of potato for seed purpose taken up in 60 acres; 3 varieties of potatoes viz., Kufri Kubrea, Up-to-date and cultivated.	- do -
4. MADHYA PRADESH			
i) Increased production of vegetables around big cities	Establishment of 4 nurseries; Production of 100 kgms of vegetables and 10,000 fruit seedlings; Demonstration plots 100	2 Nurseries established; 600 kgms of vegetable seeds, 15,000 fruit seedlings and 2,50,000 vegetable seedlings produced. Demonstrations carried out on 65 plots.	Scheme included in the State Plan 1966-67
5. KERALA			
i) Augmenting production of vegetables and quick-growing fruits in the suburb of cities and large town	i) Area to be covered 243 hectares. ii) Demonstration arranged on 48 plots. iii) Pumps sets to be distributed 100 numbers.	i) Area covered 1338 hectares ii) Demonstrations arranged on 48 plots iii) 30 pump-sets issued. iv) 392 metric tonnes of fertilisers and 2,870 Metric tonnes of pesticides distributed; 291 hectares brought under plant protection.	Scheme included in the State Plan 1966-67

(1)	(2)	(3)	(4)
ii) Development of potato cultivation	Area - 40 hectares Demonstration - 20 plots.	20 plots each of 50 cents covered; Demonstration in 20 plots.	Scheme included in the State Plan 1966-67
iii) Establishment Seed Production Centres for Vegetables	Area - 4 hectares	4 hectares covered. Plant protection measures adopted. One Seed Production Centre established.	-do-
iv) Intensive Development of banana and pineapple in selected areas	The State Government did not take up this scheme and they propose to implement this scheme as their own scheme during the Fourth Plan. Details not yet finalised.		
6. HIMACHAL PRADESH			
i) Fruit production in specially selected areas	One Progeny Orchard and two nurseries were to be established.	Establishment of one Progeny Orchard and 2 Nurseries has been processed and case submitted to higher authorities for sanction	Scheme included in the Annual Plan 1966-67
ii) Intensification of production disease-free seed potatoes in H.P.	Scheme was not implemented by Himachal Pradesh Government during 1965-66.		-do-
7. BIHAR			
i) Production of disease-free certified seed potatoes	i) 22 hectares were to be brought under foundation seed at Government Farm. ii) 202 hectares were to be brought under registered potato seed.	i) 12 hectares brought under foundation seed production of up-to-date variety at Government Farm. ii) 2 hectares brought under Kurfi Sinduri variety. iii) 6 hectares brought under Kurfi Red variety. iv) 8 hectares of Up-to-date variety raised at Registered Growers plots.	

(1)	(2)	(3)	(4)
ii) Intensive production of vegetables and quick-growing fruits in selected areas	Scheme not implemented by the State Government.		
8. PUNJAB			
i) Intensive production of vegetables and quick-growing fruits	i) Area to be covered - 3,239 hectares ii) Visit to Kitchen Gardens - 4,000 iii) Visit to School Gardens - 200. iv) Area to be sprayed - 11,336 hectares v) Demonstration plots - 450.	i) Area covered - 4,354 hectares ii) 4,005 Kitchen gardens visited iii) 128 school gardens visited. iv) 11,409 hectares sprayed with pesticides. v) Demonstrations arranged on 415 plots.	
ii) Fruit production in specially selected areas	Does not arise (please see cols. 3 - 5).		Scheme was not implemented during 1965-66. State Government as independent scheme during 1966-67.
iii) Production of certified disease-free seed potatoes	-do-		----
iv) Kitchen Gardening, Chandigarh	2000 kitchen gardens to be laid out.	650 kitchen gardens laid out. 900 kitchen gardens sprayed with pesticides.	----

(1)	(2)	(3)	(4)
9. MAHARASHTRA			
i) Increasing fruit production for export purposes	Mango - 61 hectares Banana - 101 hectares Acidlime 101 hectares Mandarin Orange - 101 Total: 364 hectares	i) Area covered: Mango - 61 hectares Banana - 182 hectares Acidlime- 34 hectares Mandarin Oranges -101 hectares Total 378 hectares ii) 370 hectares of mango orchards dusted.	Scheme included in State Annual Plan 1966-67
ii) Production of fruits in specially selected areas	i) Progeny orchards - 32 hectares ii) 16 Taluka Nuseries - 19 hectares	i) Area under Progeny Orchards - 3 hectares ii) Area under Taluka Nurseries - 5 hectares	-do-
iii) Intensive production of vegetables and quick-growing fruits			Scheme included in State Annual Plan 1966-67 (Scheme not started during 1965-66)
iv) Production of disease-free certified seed potatoes	i) Procurement of disease-free certified seed potatoes ii) Inspection of crops of potato growers for selection of disease-free potatoes.	i) 32,000 bags of seed potatoes(each) of 75 kgms) procured in 1964-65 and 23,5000 bags procured in 1965-66. ii) 445 hectares inspected in 1964-65 and 810 hectares in 1965-66.	-do-
10. GUJARAT			
i) Establishment of Community Canning Centres	3 Community centres were to be establi-ed	Three Community Centres established - one each at Ahmedabad, Baroda and Surat.	Scheme being taken up by the State as Plant scheme during 1966-67

(1)	(2)	(3)	(4)
ii) Development of potato cultivation	i) 405 hectares of additional area to be brought under potatoes. ii) To arrange 60 Demonstration plots. iii) To establish one cold storage at Ahmedabad. iv) To arrange potato competition.	i) 425 hectares of additional area brought under potatoes. ii) 60 Demonstration plots arranged. iii) Construction of one cold storage taken up at Ahmedabad by Growers Federation. One potato crop competition arranged and awards given to grower who obtained high yield.	Scheme being taken up by the State as Plan Scheme during 1966-67
iii) Vegetable seed production	To start six vegetable seed production centres.	One centre for gegetable seed production (10 acres) started at Navsari (Bulsar District).	-do-
iv) Development of Kitchen Gardening in Ahmedabad City	i) To establish 125 Kitchen gardens. ii) To organise two kitchen garden competitions.	i) 2339 seed packets and 22, 183 seedlings were distributed to 2,000 Bunglow Owners. ii) One competition of Kitchen Garden was arranged.	- do -
11. GOA			
i) Development of mango and pineapple production for export purposes	Scheme not taken up by the Goa Government.		
12. RAJASTHAN			
I) Potato Development	i) 868 hectares of additional area were to be covered. ii) 2846 quintals of seed potato were to be distributed.	i) 2297 hectares of additional area covered. ii) 1776 quintals of seed-potato distributed to growers. iii) Demonstrations arranged on 91 plots.	Scheme being continued as State Plan Scheme during 1966-67.

(1)	(2)	(3)	(4)
	iii) Demonstration to be carried out on 75 plots. iv) 20 tons of fertilisers were to be distributed to growers.	iv) 191 tons of fertilisers distributed. v) Pesticides 100 liters (Endrine) and 300 gms. (Cupramar) distributed.	
ii) Promoting Kitchen Gardening	No definite targets laid down.	i) 1566 packets of fertilisers, 210 of pesticides, 134 fruit plants and 1217 packets of seasonal vegetable seeds distributed to kitchen garden owners. ii) Kitchen garden competiton was organised and prizes distributed.	Scheme being continued as State Plan Scheme during 1966-67
iii) Vegetable seed Production	Vegetable seeds were to be produced in 2 hectares.	Vegetable seeds produced in 1 hectare	- do -
iv) Intensive production of vegetables and quick-growing fruits for supply to Urban areas (Ajmer & Udaipur)	i) 3114 hectares were to be covered under fruits and vegetables and 223 hectares to be covered under double cropping. ii) 9040 kgms. of seeds were to be distributed to growers. iii) 485 tons of fertilisers were to be distributed to growers.	i) Area cover under fruits and vegetables 3,348 hectares. Additional area under double cropping 272 hectares. ii) 9679 kgms of seeds distributed to growers iii) 361.2 tons of fertilisers distributed to growers. iv) 21436 tons of compost distributed to growers. v) Plant Protection measures carried out on 6,139 hectares and demonstrations arranged on 123 plots.	- do -

(1)	(2)	(3)	(4)
	iv) 20,000 tons of compost were to be distributed. v) 2996 hectares were to be covered under plant protection measures and demonstrations were to be carried out on 270 plots. vi) Total production targets of vegetables - 36300 tons. vii) 54,300 fruit plants were to be distributed to growers.	vi) Total production of vegetables under the scheme was 32410 tons. vii) 41956 fruit plants distributed to growers.	
13. ORISSA			
i) Intensive production of vegetables in the Ayacuts	1,883 hectares were to be covered under vegetables	1670 hectares brought under vegetables.	Scheme continued during 1966-67 as independent scheme.
ii) Kitchen Gardening	3 Kitchen gardening centres were to be established.	3 Kitchen gardening centres established one each at Bhubaneswar, Rourkela and Koraput.	- do -
iii) Certified seed Potato Multiplication Farm at Kathajon Pathafarm	49 hectares were to be covered under certified seed potatoes.	49 hectares covered under certified seed potatoes.	Scheme merged with State Government's scheme.

(1)	(2)	(3)	(4)
iv) Seed Potato Multiplication by Registered growers	49 hectares were to be covered under potatoes.	344 hectares covered under potatoes. Demonstrations carried out on 130 hectares. 12000 mds of seed potato stored in Govt. cold Storages supplied to growers.	Scheme merged with State Government's Scheme.
v) Construction of Cold Storages	Construction of two Cold Storages of 40,000 mds. capacity was up.	Construction of two Cold Storages of 40,000 mds capacity started.	Scheme to be continued as independent one during 1966-67
vi) Establishment of Banana Suckers producing centre	24 hectares were to be brought under banana plantations	41566 suckers produced	-do-
vii) Production of quick-growing fruits in & around big cities	3 Nurseries, 600 kitchen gardens, 75 Community Gardens, 30 market gardens & 3 Garden Colonies were to be covered under intensification of fruit production programme.	3 Nurseries established. 700 kitchen gardens, 23 Community gardens, 34 Market Gardens and 3 Garden Colonies covered under intensification of fruit production in Cuttack and Bhubaneshwar	Scheme to be continued as independent scheme by the State Government during 1966-67
viii) Establishment of Progeny Orchards at Jajanga in Ganjam District	10 hectares were to be brought under Progeny Orchards.		-do-

(1)	(2)	(3)	(4)
14. ASSAM			
i) Production of disease free certified seed potatoes	-	-	-
ii) (a) Foundation seed potato farm at Shillong		-	
(b) Cold Storage		Construction of cold storage at Gauhati has started.	-
iii) Intensive production of vegetables & quick-growing fruits in and around urban areas	-		-
15. UTTAR PRADESH			
i) Establishment of Progeny Orchards	2 Progeny orchards were to be established	2 Progeny orchards set up	Scheme continued during 1966-67 & Merged with the State Government's scheme for subsidiary food crops.
ii) Increasing Production of vegetables in the vicinity of big towns	i) Additional area of 2,125 hectares was to be covered under vegetables. ii) 5,250 kgms. of vegetables seeds were to be distributed to growers.	i) Additional area of 6,706 hectares covered under vegetables. ii) 41,897 kgms, of vegetables seeds distributed. iii) 1,28,17,000 seedlings of vegetables, papaya and banana suckers distributed to growers.	Scheme continued as State Government's independent scheme during 1966-67.

(1)	(2)	3)	(4)
		iii) 52,50,000 vegetable seedlings, papaya seedlings and banana suckers were to be distributed to growers. iv) 210 Demonstrations were to be carried out in regard to improved cultural practices. v) Technical advice was to be given to growers covering 8,098 hectares.	iv) 273 Demonstrations of improved cultural practices carried out. v) Technical advice rendered to fruit and vegetable growers convering 14.161 hectares.
iii)	Horticultural Development of the area along Chamba-Mussoori Road in Tehri Dist	3 Nurseries were to be established.	Area for setting up 3 Nurseries developed. Planting yet to be undertaken.	—
iv)	Intensification of vegetable production in hilly areas	81 hectares of additional area was to be brought under vegetables in hills.	137 hectares of additional area brought under vegetables.	—
v)	Scheme for vegetables seed production	4,000 kgms of vegetable seeds were to be produced.	Planting work of the scheme not started by the State Government.	—

Source: Indian Council of Agricultural Research, New Delhi.

ANNEXURE A-3

PROPOSALS FOR HORTICULTURAL DEVELOPMENT DURING THE FOURTH FIVE YEAR PLAN

		Fourth Plan outlay (Million Rs)
1.	Scheme for Fruit Production	
	(i) General Development of Fruit Production	192.80
	(ii) Augmenting Fruit Production in areas favourably situated	120.73
	(iii) Development of Fruit Production for export purposes	28.90
2.	Training of Gardeners	9.60
3.	Establishment of Garden Colonies and Orchard Development Corporation in India	30.00
4.	Establishment of Progeny Orchards and Nurseries	12.58
5.	Financial assistance to private and cooperative organisations such as Agri-Horticultural Societies and others to promote Horticulture	1.50
6.	Cocoa Development Scheme	1.07
7.	Certification, Inspection and Registration of virus-free trees	1.35
8.	Maturity Standards of fruits in relation to packing and refrigerated transport	1.50
9.	Establishment of new plant introduction	1.36

10.	Potato-seed development scheme	85.61
11.	Development of vegetable production	16.24
	Total	503.01

Source: Report of the Working Group for the formulation of Fourth Five Year Plan proposals on Horticulture, Indian Council of Agricultural Research, New Delhi.

FRESH FRUITS AND VEGETABLES

COMMODITY NOTES

SCHEME FOR AUGMENTING FRUIT PRODUCTION IN FAVOURABLY SITUATED AREAS

Crop	State	Existing Estimated area (Hectares)	Additional area to be covered (Hectares)	Loans Rate (per hectare) (Rs)	Expenditure on Loans (Rs)
1	2	3	4	5	6
1. Apple	Punjab	300	1,000	3,750	3,750,000
	Himachal Pradesh	1,250	1,000	-	3,750,000
	Uttar Pradesh	2,610	1,000	-	3,750,000
	Jammu & Kashmir	3,240	1,000	-	3,750,000
	Additional Area	-	1,000	-	3,750,000
2. Sweet Orange	District Ferozepur				1,500,000
	Punjab	4,050	2,025	1,235	2,500,000
	Dist. Sri-Ganganagar, Rajsthan	1,215	2,025		2,500,000
	Additional Area		4,050		2,500,000
3. Banana	Maharashtra	23,370	2,025	4,949	10,000,000
	Gujarat	7,670	2,025		10,000,000
	Madras	33,140	2,025		10,000,000
	Mysore	18,000	2,025		10,000,000
	Orissa	4,540	2,025		10,000,000
	Andhra Pradesh	10,360	2,025		10,000,000
	West Bengal	12,900	1,215		6,000,000
	Additional Area		13,365		

(1)	(2)	(3)	(4)	(5)	(6)
4. Grape	Punjab	30	1,000	3,750	3,750,000
	Maharashtra	1,060	1,000	"	3,750,000
	Andhra Pradesh	100	1,000	"	3,750,000
	Madras	240	1,000	"	3,750,000
	Mysore	760	1,000	"	3,750,000
	Additional Area	-	5,000	"	-
5. Pine-apple	Kerala	2,150	1,000	1,235	1,235,000
	Mysore	150	1,000	"	1,235,000
	Tripura	1,010	1,000	"	1,235,000
	West Bengal	640	500	"	617,000
	Additional Area	-	3,500	"	-
6. Manda-rin Orange	Coorg	8,100	2,025	1,235	2,500,000
	Mysore				
	Nagpur, Maharashtra	3,125	2,025	"	2,500,000
	Additional Area	-	4,050	"	-
7. Acid Lime	Kodur, A.P.	N.A.	2,025	1,235	2,500,000
	Jalgoan Dist. Maharashtra	N.A.	2,025	"	2,500,000
	Additional Area	-	4,050	"	-

Source: Indian Council of Agricultural Research, New Delhi.

FRESH FRUITS AND VEGETABLES

TECHNICAL NOTES

BANANAS

Banana is strictly a tropical plant, a non-branching, soft stemmed perinnial of six to twenty feet in height with a very few elongated leaves. About 60 varieties of banana are reported to be grown in India, of which about a dozen are of commercial importance. A brief description of these varieties is given below:

Poovan of South India: (Synonymn: champa of West Bengal, Karpur chakrakeli of Andhra Pradesh, Palenyan-godan of Kerala and Lalvelchi or Ambalvelchi of Maharashtra); it is a hardy variety and grows under perinnial system of cultivation in Madras and West Bengal. The plant is tall and slender; bears closely packed branches making it very suitable for distant haulage; a good bunch weighs 25 kg, having about 225 fruits; fruit is small; skin yellow and thin; flesh, firm; sweet, with a pleasant sourish taste; pulp has undeveloped seeds.

Basrai Dwarf of Bombay: (Syn. Vamankeli of Andhra Pradesh, Mauritius of South India and Kabuli of West Bengal and Orissa). Plant of this variety (belonging to cavendish group) is very dwarf (5' to 6' in height) and adapts itself to dry climates and windy conditions. Fruit is large, curved, skin dull yellow or greenish yellow; flesh soft and sweet; a good bunch weighs 30 kg., bears about 130 fruits and has a good shelf life; widely known throughout the banana growing regions of the world; this variety has good export potential.

Harichal or Bombay Green: (Syn. Pedda Pacha Arati of Andhra Pradesh, Malbhag of Bihar and Sapri of Assam): Fruit of this variety is very much like that of

Basrai Dwaraf, but the colour of the skin is more greenish when ripe. It is also more sweet and delicious and less curved; a good bunch weighs about 30 kg, having 160 fruits; keeps well for a longer period and is good for export purpose.

Rasthali of South India: (Syn. Murtheti of Bombay and Martaman of West Bengal): This is a popular variety of West Bengal, Mysore and Madras (particularly in Salem, Tanjore and Tiruchirapally districts). It is considered by some to be the best of table varieties in the world.

Plant is tall; fruit is of medium size; thick and stout; skin is thin, shining, ivory yellow colour, when ripe; pulp is fairly firm and keeps exceedingly well in storage; taste is delicious with inviting flavour skin to ripe apples; a good bunch weighs about 20 kg with about 130 fruits.

Chakrakeli of Andhra: (Syn. Rajabale of Mysore): This variety is mainly grown usually in betelvine gardens in Goadavari district of Andhra Pradesh; fruit is large; skin yellow and thick; pulp soft, very sweet, and melting and has a good flavour.

Hill Bananas: These are group of bananas mostly grown on the lower slopes of Nilgiris and in Madurai districts of Madras and in some parts of Maharashtra. Sirmalai and Virupakshi are the varieties grown in Madras.

Fruits of all these three varieties are, however, similar, being medium size, distinctly angular and having a dusty yellow, thick skin. Pulp is white, fairly moist, sweet, buttery in consistency and very slightly sour. A good bunch weighs about 10 to 14 kg and contains 80 to 100 fruits. Keeping quality is good and can replace cavendish types in the North, which have good export demand.

Safed Velchi of Maharashtra: (Syn. Ney Poovan of South India): It is a very delicate and choice table banana variety. Fruit is small, skin papery thin, pulp very firm, milky white, rather dry, sweet and agreeable though slightly starchy in taste. A good bunch weighs 14 kg with about 100 fruits. Keeps well and is considered a superior table fruit due to its small size and delicate appearance.

Nendrans of South India: This is a group of the world famous 'cooking plantains' represented by Nana Nendran, Attu Nendran and Myndoli of Kerala and Rajeli of Maharashtra. Fruits of these varieties are very similar in appearance and quality. Fruit is large (9" to 10"), skin thick; pulp is very firm and starchy but sweet. (Pulp should be dried, steamed or cooked before eating, as it is not easily digestible when taken fresh). A good bunch weighs 25 kg and contains 90 to 100 fruits. 'Banana fig' is prepared from all the varieties of Nendran.

Red Banana: (Syn. chen Kadali of Madras):
This is the most robust variety of bananas grown in India. Fruit is large, thick and stout; red scarlet in colour when ripe; skin is thick; pulp is saffron-coloured, firm, fairly moist, sweet with good flavour. A good bunch weighs 18 to 27 kgs having about 100 fruits.

Monthan of South India: (Syn. Bankel or Khasadia of Maharashtra and Kanchela of West Bengal): This is primarily a cooking variety. Fruit is big, thick, shoe shaped, almost straight and angular. Skin is thick and yellow. Pulp is moist, soft, spongy, slightly sweet, mildly sub-acid and has a hard core in the centre. Bunch is small, weighs 18 to 22 kg with 100 to 112 fruits.

CITRUS

Important citrus fruits grown in India on a commercial scale are the sweet oranges, (Malta or Sathgudi or Mosambi), Santra or Mandarin Oranges, limes and the lemons. Grapefruits are also grown in some parts of the country but to a limited extent. All these citrus fruits belong to the same botanical family, Rutaceae.

Sweet and Mandarin Oranges

Oranges grown in India are of two distinct species or family groups - sweet orange (Citrus sinenis) and mandarin orange (Citrus reticulata). Typical examples of the most widely cultivated varieties of sweet oranges in India are Mosambi (a corruption of Mosambique) of the Bombay - Deccan, Malta of the Punjab and Sathgudi or Chini of South India. Another variety called the Batavian, grown in Northern circars of Andhra Pradesh is very similar to Sathgudi.

The mandarin or santra group includes all types of 'loose jacket' oranges such as Nagpur santra, Coorg santra, the Khasi Orange and the Desi type.

Sweet Oranges Varieties and their Characteristics

Malta Blood Red, Pineapple, Mosambi and Sathgudi constitute the most important varieties of Sweet oranges cultivated in India.

Malta Blood Red: A number of strains of this variety is under cultivation. Some strains are seedless and very prolific, seed ones are comparatively low yielders and have five to twelve, seeds per fruit. The skin is cadmium

yellow with scarlet brush; rind usually thin, tight, glossy; pulp corncoloured and streaked red early in the season, but blood red when fully ripe, fine grained, melting and sweet; juice abundant, red coloured, sweetness and acidity well-blended; total soluble solids 10% and acidity 0.5%; flavour very rich and pleasant; quality excellent. The Brix is 11% to 12.4%; weight per fruit 180 to 200 gms.

This variety is reported to have done well in the Submontane districts of Punjab (Fazalika, Faridkot and Sirsa). In Mediterranean Europe, several varieties of this type are cultivated but do not figure prominently in the international trade. They are sold primarily in the domestic markets.

Mosambi: Fruits are small or medium; subglobose or elongated in shape; surface is smooth with longitudinal furrows. Distinctive feature is the circular ring (areole) around apical end. The rind is marigold, thin and tight, pulp apricot yellow; juice content low; acidity approximately 0.33% (as compared with about 0.82% in other Malta orange varieties); fruit contains 8 to 20 seeds.

This variety is cultivated extensively (about 120,000 acres) in Maharashtra.

Sathgudi: Fruits are medium sized, subglobose, rind medium thick tight, semi-glossy, smooth and finely pitted; colour empire yellow; areole and navel abscent; pulp uniformly straw-coloured, tender; flavour fair.

In most cases, the fruit does not develop proper colour and is picked before it is fully ripe, consequently, the total soluble solids is low (6.5% to 9%).

This variety is grown in Cuddapah, Chittor and Kurnool districts of Andhra Pradesh (about 5,000 acres).

Pineapple: The fruit is medium sized, subglobose, orange coloured when mature; rind thin, tight, smooth, bright and glossy; pulp primose yellow, fine grained; juice abundant, sweet; flavour rich with 9.5% total solids and 0.5% acidity. Seeds are nearly 24 per fruit.

This variety is grown on a limited scale in the Punjab.

Mandarin (Santra) varieties and their characteristics:

There are several distinct groups of mandarin varieties; most important of them are described below:

Nagpur Santra: Fruits are sub-globose; colour generally cadmium but not uniform; surface smooth, glossy; base (stalk end) is slightly drawn out and warty with glandular furrows; rind thin, firmness soft, adherence slight; segments 10 to 11, weight 4 to 6 ozs per fruit; pulp vesicles are uniformly marigold coloured; texture fine and tender; flavour excellent; juice abundant, saffron yellow, sweetness and acidity well balanced; seeds 4 to 11 per fruit (usually seven); total solids 11.5% to 13.5% acidity 0.514% to 0.566%.

This variety, grown extensively in Vidharba region of Maharashtra, is one of the finest mandarins grown in the world. It is the only budded variety grown on a commercial scale in the country. This variety does not do well in other regions of the country.

Khasi orange: Fruits are depressed, globose to oblate; colour orange yellow to bright yellow; surface smooth, glossy; base usually even or obtuse, slightly ribbed; rind thin, firmness soft to very soft, adherence

very slight to none; segments 8 to 13 (usually ten) pulp vesicles uniformly orange coloured, texture somewhat coarse, very melting, flavour agreeable; juice abundant, sweetness and acidity well balanced, fruit weighs five to eight ounces and contains 8 to 25 seeds per fruit (usually 10 to 15); total solids 11.2%; acidity 0.339%.

It is the main variety of mandarin grown in Assam; it is raised from seed. It is locally called Soh-niamatra and passes under different trade names like shella orange, karimganj orange and lushai orange after the names of places of production.

Coorg oranges: Fruit is oblate to globose; skin finely pepillate and finely wrinkled, glossy; base necked or depressed with glandular ribs extending through the collar; rind thin to medium, firmness & soft adherence slight; segments 9 to 11, pulp vesicles uniformly coloured; texture fine and tender; flavour good; juice abundant, deep chrome; sweetness and acidity well blended when properly ripe, seeds 14 to 30 per fruit; total solids 10.0%; acidity 0.516%.

It is grown on a large scale in Coord and wind tracts. It is grown from seed..

Introduction of Exotic Varieties

Sweet Oranges: Washington Navel, Jaffa, Valencia Late and Hamlin are important among the exotic varieties introduced in the country.

Washington Navel, the famous Californian variety has been grown on experimental basis in research farms in Coorg. Its performance has not yet been fully assessed. Shamouti of Palestine has proved suitable but so far it

has not attained any commercial importance. This world famous Shamouti (Jaffa) orange (seedless orange of Palestine) is reported to be ideal for introduction in India, particularly in the dry regions of Indo-Gangetic plains. Hamalin is another good variety which has proved successful in the Punjab as one of early maturing varieties.

Mandarins: Satsuma of Japanese origin has been introduced with some success in Saharanpur and Patiala regions. This variety is resistant to low temperatures (upto 12°F) and bears fruits early in season.

Dancy and Kinnow (hybrid) varieties are reported to be suitable for introduction in Indo-Gangetic plains.

Propagation

Sweet oranges are universally propagated by budding. The mandarins or loose-jacket oranges are largely propagated by seed all over the country except the Nagpur Santra which is propagated by budding. Expert opinion suggests that propagation by budding should be popularised because the budded plants come to bearing early and thereby are economically advantageous. (Budded plants come to bearing from the fourth year and the seedling trees from eighth year).

Seasons of Harvest

Type	Variety	State	Duration of Season	Period of Production
Sweet orange	Malta	Punjab	Dec-March	Jan-Feb
	Mosambi	Maharashtra	1st crop March-July	April-June July
			2nd crop June-Aug	Oct-Dec
			3rd crop Sep-Feb	

Contd.....

Type	Variety	State	Duration of Season	Period of Production
Sweet Orange	Sathgudi	Madras	1st crop June-Aug	July
			2nd crop Sep-Jan	Oct.Nov
Mandarin	Nagpur Santra	Maharash-tra	1st crop Mar-July	April-June
			2nd crop June-Aug	July
			3rd crop Sep-Feb	Oct-Jan
		Madhya Pradesh	1st crop Feb-May	Mar-April
			2nd crop Sep-Jan	Nov-Dec
		Punjab	Nov-Feb	January
	Coorg Santra	Mysore	1st crop Nov-Mar	Jan-Feb
			2nd crop June-Aug	July
			3rd crop Sep	Sep
	Assam Santra	Madras	May-Nov	June-July
		Assam	Nov-Mar	Dec-Jan

Limes and Lemons

Limes: Among the main commercial varieties of acid lime cultivated in India, Kagzi nimboo (C. aurantifolia Swingle) is important. The fruit of this variety is oval shaped, smaller in size (1" to 1½" diameter) and yellow in colour. Rind is smooth and thin; pulp whitish and juice acidic with a distinct flavour. The other important variety is Pati Nimbu which is round in shape.

Lemons: Main commercial varieties (mostly introduced from America and Europe) grown in the country include Italian, Eureka, Villa France, Lisbon and Geneva. These fruits are generally oblong in shape, medium in size, lemon yellow in colour, having base slightly small with the apex rippled. The rind is smooth, oil cells large and the flesh is pale greenish yellow in colour. Juice sacs are small, with abundant juice which is strongly acidic.

Italian Lemon, a variety of Europe, is the most important and has admirably adapted itself to varied conditions of dry and moist climates in different parts

of India. It is perfectly seedless and is prized for pickling and for making cold drinks.

Propagation

Limes: The Kagzi nimboo can be propagated by seed, layering and budding. Growers in India prefer raising it from seed as seedling trees can withstand rigours of climate better than the budded plants, and bear heavy crops of more or less uniform grade.

Lemons: Italian lemon is propagated by budding.

Seasons of Harvest

Kagzi Nimboos bear fruit round the year due to successive flowerings. Lemon varieties also show the same behaviour. Due to varying climate, maximum harvest periods differ, as shown below:

Type	State	Region	Period of Peak Production
Lime	Andhra Pradesh	Circars	March-April
		Rayalaseema	June-August
		Guntur	April-June
		Nellore	April-June
	Madras	North Arcot	June-August
		Tirunelveli	Jan-March
	Maharashtra		July-Sept. (60%)
	Gujarat		Feb-May (30%)
	North India		Aug-September

Grapefruits

Grapefruit (popular breakfast fruit in Western countries) is cultivated only to limited extent in India (431 hectares in 1961-62, mostly in Rajasthan). Important

commercial varieties include Marsh's seedless, Triumph, Duncan, and Foster. Marsh's seedless is the most popular variety. Fruit of this variety is oblate, round in shape, with a slight yellow colour. The rind is thick, smooth and has small oil cells. Juice sacs are small and the flesh is greyish-green in colour. The bitterness is not pronounced; sweetness and acidity well balanced.

Propagation: Grapefruit is propagated mainly by budding.

Seasons of Harvest:

Punjab and Rajasthan	Jan-March
Bombay (Deccan)	Sept-November

Production in India

Estimated production of citrus fruits in India during 1961-62 was as follows:

	Production (Tonnes)	Percent
Sweet oranges	2,78,213	22.95
Mandarin oranges	4,73,767	39.09
Limes	3,50,683	28.93
Lemons	64,406	5.34
Other citrus fruits (Sour & Bitter oranges etc.)	44,800	3.68
Total	12,11,869	100.00

ANNEXURE A-7

PINEAPPLES

Pineapple (Ananas cosmosus family Bromeliaccae) is a herbaceous perennial growing to a height of two to four feet, depending on the variety and the soil and climatic conditions. Pineapple fruit is a compound structure consisting of a number of fruitlets or "eyes". The fruit arises from the apex of the stem at the centre of the plant, only one fruit being borne on each stem. The fruit stalk runs through the fruit as the core and terminates in a cluster of small leaves (known as 'top' or 'crown').

Varieties

About 90 varieties of pineapple are under cultivation in different parts of the world. In India, only three varieties Kew, Queen and Mauritius are cultivated on commercial basis. (There are a few indigenous varieties, which are not important).

Kew: This is a late fruiting variety, ripening in August and September. Fruit is generally oblong in shape, tapering slightly towards the 'crown'. The surface of the fruit is yellow when fully ripe. Flesh is light yellow, almost fibreless, very juicy in the agreeable taste and flavour. The fruits are the biggest among all varieties grown in India, weighing on an average 3 kg. (5 to 7 kg in Assam, 3 to 7 kg in Madras, 2 to 5 kg in Kerala). The eyes of this variety are broad and shallow, making the fruits suitable for easy trimming as required for cannings.

Queen: This is an early fruiting variety, ripening in June-July. Fruits are cylindrical, rich yellow colour when fully ripe; flesh is sweetest among all the varieties grown in India, with an attractive deep yellow-look, firm, transparent, a little stringy and highly flavoured. The eyes

of the fruit are prominent deep set and irregular and as much not preferred for canning. Because of its small size and charactersitic flavour, it is very much in demand for table purpose.

Mauritius: This is a mid-season variety, ripening in July-August. There are two types with this variety, yellow and Red-skinned. The yellow type is oblong, sloping slightly towards apex from the middle of the fruit, green in colour when mature and turn yellow when ripe. The flesh is light yellow, fibrous and medium sweet. Red-skinned type is round at the base and sloping abruptly towards the crown. Fruit is green when mature and turns red when fully ripe. Flesh in reddish-yellow, fibrous and sweeter than yellow type.

Many other exotic varieties have been introduced in Maharashtra, Madras, Kerala, Assam and Tripura. Among these, the only variety of importance is 'Charlotte' 'Rothchild' grown in South India. The taste of the fruit of this variety is ranked with the 'Kew' variety. It refers to smooth Cayane strains of varieties, including hybrids that have been developed from these varieties. The Red Spanish strains of varieties is popular for the fresh market. Among the indigenous types, the prominent ones include Jaldoop and Lakhat grown in Assam and Simhachalam grown in Andhra Pradesh.

Canning varieties

'Giant Kew' is the leading commercial variety valued particularly for its canning quality. Extensive canning trials of the three varieties of pineapple conducted in CFTRI and Jadavpur University have shown that percentage recovery of 'A' grade material fit for canning from 'Giant Kew' ranged from 24 to 32, from Kew 13.7 to 20.8 and from Mauritius from 9.7 to 11.4 per cent confirming the suitability of 'Giant Kew' for canning purposes.

Propagation

Pineapple is propagated vegetatively, using 'suckers', 'slips' or 'crowns'. The general preference is for 'suckers' as they produce fruit earlier (14 to 18 months) than slips or crowns (2 years). But, Kew varieties are propagated by 'slips' as 'suckers' lead to lower yields.

Seasons of Harvest

Pineapple flowers from February to April and ripens during July-September, depending on the variety. A small proportion of area under Kew variety throws off-season flowers and the fruit ripens from September to December. These off-season fruits are more acidic and are not valued for the table.

Grade Standards: Details of tentative grade specification of pineapples have been formulated by the Directorate of Marketing and Inspection.

Production in India

Estimated production of pineapple in different states during 1961-62 were as follows:

	Tonnes	Approximate distribution of varieties
Assam	32,810	65% kew 25% Queen and Mauritius 10% Jaldoop
Kerala	19,970	60% Kew 30% Mauritius 10% Others

	Tonnes	Approximate distribution of varieties
West Bengal	6,570	-
Tripura	5,590	100% Queen
Orissa	3,580	-
Goa	2,540	-
Others	4,590	-
Total	75,650	

MANGOES

Varieties and their Quality Characteristics

Mango grown in India belongs to botanical species Mangifera indica L. But a large number of varieties, estimated at over 1,000 are cultivated in various parts of the country, each having its own peculiar taste, flavour and consistency of pulp. On the basis of a comprehensive survey, 210 varieties have been described with reference to morphological and horticultural features. Many of these varieties being grown from seed are not considered as standard varieties (because of their mono-embryonic nature).

The famous dessert Indian mangoes (standard commercial varieties) are raised as grafts, which include:

Maharashtra	Alphonso and Pairi
Uttar Pradesh	Langra, Safeda, Dusehri, Samar Bahisht, Chausa, Bombay Green (Malda) and Fazli
South India	Himayaddin, Alampur Baneshan and Mulgoa
Bihar	Langra, Bombai, Sardalu and Gulab khas
Goa	Fernandin and Mankurad

Bangalora (known as Totapuri in Bombay), Neelum and Rumani of South India (mainly in Rayalaseema and Circars in Andhra Pradesh), though inferior in taste and flavour to dessert varieties mentioned above, are well known for heavy yield, excellent keeping quality and abundance of fibreless and hard pulp. Suvarnarekha and Banganappli are the other varieties of importance cultivated in Circars and Rayalaseema in Andhra Pradesh.

Varieties utilised for Canning

Alphonso of Ratnagiri, Safeda, Saroli and Dasheri of U.P., Badami of Mysore, Baneshan of Circars and Raspuri and Malgoa of Madras and Mysore are among the varieties of Mango found suitable for canning as slices. Kala-ishad, Pairi, Langra, Fazli, Sundri Himsagar, Bangalora and Banganapalli (Baneshan) are also being utilised for canning purposes. Almost all the varieties which have been found suitable for canning as slices are also considered to be good for pulp or juice. Characteristics of important commercial types of Indian mangoes are given in Annexure A-8(a).

Preliminary trials carried out on suitability of mango varieties for preservation have shown that for production of best mango pulp, the variety should be slightly juicy, should possess a strong and pleasant aroma, bright coloured pulp and be free from stringiness. Some of the mango varieties gorwn from seed, though may not be good as dessert fruits, have been found to be suitable for production of pulp.

Period of Bearing of Fruits

Grafted trees begin to bear from the fourth year and reach peak period in the 20th year. A yield of 1,000 to 3,000 fruits per tree (during 'on' years) is considered good for any grafted variety in their peak bearing periods (20 to 40 years in age). Seedling varieties generally live longer and bear much heavier crops (upto 10,000 fruits per tree in favourable situations). Area under seedling and grafted mangoes has been estimated at 37% and 63% respectively of the total area of 7.48 lakh acres in 1961-62.

Seasons of Harvest

Bombay	April-May (Ratnagiri)
	May-June (in other areas)
Gujarat	May-June
Madras	April-May
Andhra	April-May (Coastal district)
	May-August (Rayalaseema)
Mysore	May-August
Bihar, Uttar Pradesh and Other Parts of North India	June-August

Alternate Bearing

Mango trees of less than 10 years put forth flowers as well as vegetative shoots and bear regular crop every year. Trees older than 10 years produce profuse blossoms and sparse vegetative growth in one year and profuse vegetative growth and sparse blossom in the succeeding year. This leads to 'alternate bearing' or 'biennial bearing' in mango which means that mango bears heavy and lean crops in alternate years called 'on' year and 'off' year respectively. Studies conducted in different parts of the country indicate that the 'alternate bearing' is an inherent varietal characteristics of mango and it cannot be easily eliminated.

Grade Standards

Grade designations and definitions of quality have been prescribed under 'Agmark' for Alphonso and Kanchan (Bathore) intended for marketing within the country. Grade standards have been prescribed separately for Alphonso variety intended for export markets.

ANNEXURE A-8(a)

CHARACTERISTICS OF SOME IMPORTANT COMMERCIAL TYPES OF MANGOES CULTIVATED IN INDIA

Sl. No.	Type	Main areas of cultivation	Fruit characteristics	Keeping quality	Fruiting season	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Alampur Baneshan	Andhra Pradesh, Madras	Large, oblong to oblong-oval primuline yellow, flesh firm, maize yellow, juicy	Good	Mid-season	Poor to Medium bearer; very good edible quality
2.	Alphonso, Badami, Gundu, Appus, Khader	Konkan (Maharashtra), Mysore, Madras, Kerala, Andhra Pradesh	Medium, ovate-oblique; capucine yellow; flesh firm, capucine yellow with abundant juice	Good	Mid-season	Medium to heavy bearer; excellent quality
3.	Bangalora, Totapuri, Collector, Killimukhu	Andhra Pradesh, Madras, Mysore	Medium, oblong with necked base and prominent beak; skin thick, lemon chrome colour, flesh firm, mustard yellow, juice scanty	Good	Mid-season	Heavy bearer; poor to medium quality
4.	Banganapalli, Baneshan, Chaptai, Safeda	Madras, Andhra Pradesh	Large, obliquely oval; base obliquely flattened; primuline yellow; flesh firm to meaty, maize yellow; juice moderate	Good	Mid-season	Heavy bearer; good quality
5.	Bombay Yellow, Bombai	Uttar Pradesh, Bihar	Medium, ovate oblique; base obliquely flattened; golden yellow; flesh firm, capucine yellow; moderately juicy	Medium	Early	Medium bearer; good edible quality
6.	Duseheri, Dashehri Aman, Niral Aman, Kamyab	Uttar Pradesh, Punjab, Delhi	Small to medium, oblong to oblong-oblique, primuline yellow; flesh firm, capucine yellow; juice scanty to moderate	Good	Mid-season	Regular heavy bearer; good quality

(1)	(2)	(3)	(4)	(5)	(6)	(7)
7.	Fazli, Fazli Malda	West Bengal, U.P., Bihar	Large, oblong oblique, cerro green; flesh firm, cosse green when mature and primuline yellow when fully ripe	Good	Late season	Heavy bearer; good quality
8.	Gulab Khas	Bihar	Small to medium, oblong oblique, base necked to tapering; cadmium yellow with a blush of firefly on shoulders; flesh firm cadmium yellow; juice moderate to abundant	Very good	Mid-season	Heavy bearer; very good edible quality
9.	Langra, Banarsi Langra	Uttar Pradesh, Bihar	Medium, ovate; luttuce green; flesh firm to soft, lemon yellow with strong flavour; moderately juicy	Medium	Early to mid-season	Heavy bearer; very good quality
10.	Malda, Bombay green	Uttar Pradesh and many other areas of Indo-Gangetic plain	Medium, ovate-oblong to oblong reniform; spinach green; flesh firm to soft, mikade orange; moderately juicy	Medium	Early	Heavy bearer; fruit of good quality
11.	Malgoa	Andhra Pradesh, Maharashtra, Mysore and Salem districts of Madras	Large, roundish oblique; primuline yellow, flesh firm, mustard yellow; juice moderate to abundant	Good	Often late	Poor bearer; fruit, very good edible quality
12.	Neelam	Drier districts of Madras and Andhra Pradesh	Medium, ovate-oblique; saffron yellow flesh firm, primuline yellow, moderately juicy	Very good; stands long transport	Often late; sometimes twice a year	
13.	Olour	Kerala	Medium, oval, capucine yellow; flesh soft, moderately fibrous, capucine yellow; juice moderate to abundant	Medium to good	Very early season (February-March)	Polyembryonic; heavy bearer; moderately resistant to winds and hoppers

(1)	(2)	(3)	(4)	(5)	(6)	(7)
14.	Pairi, Raspuri Peter, Madusalai; Grape, Gola	Central districts of Madras, Mysore, Andhra Pradesh	Medium ovate; apricot yellow; flesh Soft, fibreless, primuline yellow; juice abundant	Medium to poor	Early Season crop	Heavy yielders; fruit of good quality
15.	Rajapuri	Gujarat	Medium to large, ovate to ovate-oblong; deep chrome; flesh firm prinnard yellow; moderately juicy	Medium	Early to mid-season	Heavy and regular bearer
16.	Rumani	East Coast districts of Madras	Medium, apple-shaped; primuline yellow with a blush of red on shoulders; flesh firm to meaty, primuline yellow; moderately juicy	Good; stands long trans-port	Mid-season to late, often bears an off-season crop	Heavy bearer
17.	Safeda Lucknow	Uttar Pradesh	Large, ovate; capucine yellow; flesh soft, sparingly fibrous, primuline yellow, juice abundant	Medium	Late-season crop	-
18.	Safdar Rasand	West Bengal, Bihar	Medium, oblong to oblong oblique; skin thick, smooth golden yellow; flesh firm, fibreless, capucine yellow; moderately juicy	Medium	Early season	Very productive regular bearer
19.	Samarbehisht, Chausa	Uttar Pradesh	Medium, ovate to ovate-oblique; canary yellow; flesh firm, amber yellow; moderately juicy	Medium to Good	Mid to late season	Heavy bearer; good quality fruits
20.	Swarnarekha, Sundri, Latsundri	Andhra Pradesh	Medium, ovate-oblong, light cadmium with a blush of jasper red; flesh fibreless, primuline yellow	Good	Early season	Heavy bearer

(1)	(2)	(3)	(4)	(5)	(6)	(7)
21.	Vanraj	Baroda in Gujarat	Medium to large, ovate oblong; deep chrome with a blush of jasper red on shoulders; flesh firm to soft, fibreless, cadmium; juice abundant	Good	Mid to late season	Medium productive; regular bearing; fruit of good quality
22.	Zardalu	Bihar, Uttar Pradesh	Medium, oblong to obliquely oblong; golden yellow; flesh firm to soft, sparingly fibrous, capucine yellow; moderately juicy	Medium	Mid-season crop	Medium to heavy bearer
23.	K.O. (Himayaddin Neelam)	Rayalaseema in Andhra Pradesh	Medium to large, oblong to oblongoval; skin leathery, yellowish, flesh firm, fibreless	Keeps well	Mid to late season	Heavy bearer; very good quality
24.	K.O. 11	-do-	Large, Ovate; Skin roughened to Slightly Warty, Yellowish, flushed with Coral red; Flesh Soft, fibreless	—	Mid-season	Medium to heavy bearer

Source: Wealth of India, Raw Materials, VI: L-M; Council of Scientific & Industrial Research.

GRAPES

Bhokri or Nasik Green

This is the most common commercial variety grown in the country. It is a heavy bearer and yields 37.5 tonnes or more per hectare. The berries are green, round, sweet and have thick leathery and tough skin. Each berry weighs 3 to 6 gms. The bunches are large, compact, long and tapering. Berries do not keep well for long and the seeds are hard and bold. Presently, this variety is estimated to cover 80 per cent of the area under grapes in Maharashtra It is also grown in Madurai District in Madras. This variety, because of poor consumer preference and rapid growth of other delicious strains, is fast declining. Every year a large area under this variety is being replaced by other superior varieties.

Pachaidraksha (green grape)

This is mostly grown in Madras State particularly in Madurai and Salem districts. It is very much similar to Bhokri in quality, appearance and yield.

Phakdi (Fakdi)

Phakdi is the second leading variety of grapes in Maharashtra. It is generally a shy bearer but under favourable circumstances it can compete with Bhokri. The grapes of this variety are superior in taste. The bunches are very large, loose, irregular and heavily shouldered (broad-winged) on the sides and pendulous in the middle. They are usually smaller in size than Bhokri. The colour of the berries is whitish green, turns brown when ripe. Berries are oval in shape. The berries weigh between 3 to 5 gms.

Being extremely delicate, it does not keep well for long and is therefore not suitable for long distance transport. The average yield is 20 to 25 tonnes per hectare.

Bangalore Blue (Bangalore Purple or Aurangabad Blue)

This variety is chiefly grown in Mysore State and yields 20 tonnes to 25 tonnes per hectare. It is quite a distinct type of grape which bears bluish purple berries. The berries weigh between 4 to 6 gms and are round, plumpy with thick and tough skins. The pulp is greenish and mucilaginous and firm. The taste is sweet and sub-acid. The bunch is medium sized and compact. This variety is singularly suited for wine manufacture. This is the only grape variety available for almost all the months of the year. It has already spread in Bangalore, Kolar district and is extending fast in Jumkur Madya and Mysore districts. Presently it is grown in 5,000 acres in Mysore State.

Pandhri Sahebi (white big grape)

Large whitish grape of superior quality, which develops an ambar on maturity. This is one of the finest table varieties grown in Maharashtra. It has a good keeping quality and is singularly suited for distant markets. It yields 6 to 10 tonnes per hectare. Thin skin, a sweet firm pulp and soft seeds - bunch is large and loose - this variety is partially self-sterile and hence a shy bearer and produces a good many small seedless berries when planted as a pure crop; but when planted near Bhokri, it bears good bunches.

Kali Sahebi (Black big grape grown in Maharashtra)

Berries are cylinderical slightly drawn in the middle and are distinctly flattened and depressed at the stigma end. Their yield is 12 to 17 tonnes per hec. Its keeping

quality is good, but the fruit stalks are slender and weak which makes the berries drop while picking and peaching. Its production is on a restricted scale, though it fetches a good price.

Anab-e-shahi

This is a unique variety of grapes mostly grown in and around Hyderabad. Its cultivation is fast extending to other States. In Maharashtra, it is becoming the second most extensively cultivated variety after Bhokri. It is a very popular variety in Aurangabad, Poona and Nasik districts of Maharashtra. This is considered as the best dessert variety of grapes grown on a commercial scale in the country. Berries are oval, whitish, thick skinned and sweet and are of excellent eating quality. Bunches are medium sized and moderately compact. A bunch may weigh 1 to 2 lbs. Berries each weigh 11.6 gms. and their yield is 37 tonnes per hectare.

Gulabi (Karachi)

It is similar to Muscat (Hamburg) of Australia. Berries round, purple thick skinned, sweet with soft pulp of rose aroma. Each berry weighs between 3 to 5 gms. It stands transport well.

Kandhari

Grapes of this variety are purple, in colour, and are of medium size with compact and shouldered bunches of more or less rectangular shape. It is a good keeper and stands transport well.

Dakhiff

This variety is mostly grown in the Punjab. Berries are purple coloured round and thick skinned. Pulp of the

berries has sub-acidic taste. The bunches are compact and medium sized. It is a prolific bearer and is noted for its thick juice. As a table variety, it is considered inferior.

Kishmis

This variety is similar to Thomson seedless and is reported to have made a great success in Pattiveeranpatti and Gangaveernpatti areas in Madurai district.

Cros Colman

This is a fine juice and wine grape variety and gives fairly good yield.

TEMPERATE FRUITS

Apples

Main apple growing areas in India are Jammu and Kashmir, Himachal Pradesh, Kumaon Hills (Uttar Pradesh), Darjeeling (West Bengal) and Nilgiris (Madras State). The varieties of apples grown in these areas are as under:

Jammu and Kashmir

Irish peach, Benoni, Cox's Orange, Pipin, Anne Elizabeth, Golden Russet, Yellow Newton and Delicious.

Uttar Pradesh

Early varieties:	Red Astrachan, Beauty of Bath, Early Shanburry and Benoni
Mid Season:	King of Tomkin's country, King of pipins and Red Delicious
Late Variety:	Pick's Pleasant, Yellow Newton, Pipin, Rome Beauty and Buckingham

Himachal Pradesh

Early variety:	Red June, Stark Earliest and King of Pipins
Mid Season:	Red Delicious, Royal Delicious and Golden Delicious
Late variety:	Rus pipin and Granny Smith

The present trend, however, is towards growing varieties of 'delicious' group viz Golden, Red, Starking and Richard. The main seasons of harvest of apples in different regions are as follows:

Himalyan Region	:	Mid June to October
Jammu & Kashmir	:	End June to Mid December
Uttar Pradesh, Himachal Pradesh and Punjab	:	Mid July to Mid September
South	:	May to Mid August

Peaches, Pears, Apricots and Plums

Production of peaches, pears, apricots and plums is concentrated in Uttar Pradesh, Punjab, Himachal Pradesh, Jammu and Kashmir and Madras (Nilgiris).

Seasons of harvest of these fruits in the main growing areas are as follows:

Peaches	: Uttar Pradesh, Himachal Pradesh and Punjab	: June-July (Sometimes upto August)
	The peach season starts a fortnight earlier in plains of Uttar Pradesh than in the hills and is of about two months from Mid May to Mid July.	
	Jammu & Kashmir - late	- begins in July and extends to Mid September.
Pears	: Punjab, Uttar Pradesh and Himachal Pradesh	: Mid July to October
	Jammu and Kashmir	: End July or beginning of August to November
	Madras	: April to July (English Pears) July to October (counts)
Apricots	: Uttar Pradesh, Himachal Pradesh and Punjab	: Last week of May to July end
	Jammu and Kashmir	: June to July
Plums	: Uttar Pradesh, Punjab, Himachal Pradesh and Delhi	: Mid May to Mid July
	Jammu and Kashmir	: June to August
	Madras	: April to June

Varieties Suitable for Preservation Industry

Peaches: Clingstone is preferred. Peragrine, Early Beatrice and Elberta are some of the varieties used for canning.

Pears: Willian Bon Chritien (Bartlett) is considered excellent canning variety and is in great demand for the preservation industry.

Apricots: Royal variety is best suited for canning.

Plums: Victoria, Greenage, Grand Duke and Damson are preferred for canning purposes. Grand Duke is considered very good for preparation of jams.

Strawberries

In India, strawberry is cultivated on a small scale mainly in the hilly regions but its cultivation could be profitably extended to plain areas.

In the hilly regions, varieties like 'Royal Sovereign', 'Srinagar' and 'Dilpasand' are popular. Exotic varieties such as 'Torrey', 'Tioga' and 'Solana' (introduced from California) are reported to be suitable for cultivation under Indian conditions. The Indian Agricultural Research Institute has evolved a variety called 'Pusa Early Dwarf', which is recommended for cultivation in the North Indian Plains. In Bangalore, the variety grown goes by the name 'Bangalore'.

The seasons of harvest in hilly regions extend from May to June and in plains from February to April. An average yield of 25 tonnes per hectare is considered economical.

GUAVAS

Guava is wholly edible with the skin which is papery thin and almost merges with the pulp. It has a sweet aroma and is refreshingly acidic in flavour. Except for its penetrating strong scent in advanced stage of ripening and the hard seeds in the inner pulp, Guava is considered as one of the most delicious and luscious fruits. Guava contains four to five times as much vitamin C as fresh orange juice and upto ten times as much as most of the tomato varieties. It is also a fair source of vitamins A and B, iron, calcium and phosphorus. It is pre-eminently suited for canning and jelly making and for preparing many other kinds of preserves e.g. fruit butter. Canned guavas often have a taste and aroma better than that of fresh fruit.

Varieties and their Characteristics

Most of the commercial varieties of Guava under cultivation in different parts of the country are introductions from Uttar Pradesh. A brief description of the important varieties is detailed below:

Uttar Pradesh

(i) Apple colour — A good variety but not extensively cultivated on account of its shy bearing habit; has very attractive apple like colour; fruits medium size; round to spherical; skin colour light red or pinkish; pulp soft, flesh creamy white, melting soft; flavour pleasant; taste sweet; average weight 4 oz; good keeping quality.

(ii)	Safeda Allahabad	Best variety grown all over the State; quality of fruit and fruiting habit good; fruit medium size; round; skin colour straw yellow; taste sweet; quality very good; keeping quality medium; heavy bearer; average weight 6 oz.
(iii)	Red-fleshed	A Commercial variety well known for its red flesh; fruits medium; ovate roundish; skin colour greenish yellow or pinkish yellow; pulp soft melting; flesh in colour; flavour pleasant and smells like apricot; taste acidic sweet; fruit weight 6.3 oz.; quality medium; poor keeping quality; heavy bearer.
(iv)	Seedless	Poor yielder but well known for its quality and seedlessness; medium size; pulp white, semi-hard, soft, when fully ripe; sweet; excellent quality.
(v)	Lucknow-49	A selection from Safeda. Not widely grown in this State, but is a promising one. A commercial variety of Bombay and South India; fruits medium to large; ovate round; skin yellowish white; pulp soft and melting; flesh creamy white; flavour slightly acidic; taste acidic sweet; fruit weight 6.4 oz.; quality good; keeping quality very good; heavy bearer.

(vi)	Chittidar	Not much different from Safeda except for some red spots here and there on the skin of the fruit ("chittis"); fruits medium; roundish ovate; pulp soft and melting; flesh yellowish white; flavour mild taste acidic sweet; fruit quality medium; keeping quality good; medium bearer.
(vii)	Mirzapur	A seedling selection from Allahabad Safeda; medium; roundish; pulp soft when fully ripe; flesh white; flavour mild; taste medium; acidic sweet; fruit quality medium; keeping quality good; medium bearer.
(viii)	Karela	A medium variety not very popular; large; terminate to pyriform in shape; greenish yellow colour; pulp; soft melting flesh white and granular; pleasant and very rich flavour; sweet taste; fruit weight 8.5 oz; fruit quality medium; keeping quality medium to good; poor bearer.
	Bihar	Safeda Allahabad, Seedless, Harijha, Red-Fleshed, Chittidar
	Maharashtra	L-49, L-24, L-26, Kothrud, Sindh Dharwar, Nasik, Dholka, Seedless Guava.
	West Bengal	Barnipore and other U.P. types.

Canning Varieties

Safeda, Lucknow 49, Chittidar and Karela are among the white fleshed varieties of guava suitable for canning purposes. Pink flesh variety grown in Mysore (which contains a water-insoluble pigment) is found well suited for the preparation of nectar type beverages. For canning and processing, varieties like Allahabadi, Apple guava, Safeda and Dehra Dun are found suitable.

Period of Bearing

Guava begins yielding fruits from the fourth year and reaches the optimum bearing stage in its eighth year. It continues to bear heavily for 30 years and, if adequate care is taken, upto 50 years. A seedling tree of eight to ten years yields on average only 400 to 900 fruits (65 to 80 kg) while grafted or a layered tree of the same age may yield 1,000 to 2,000 fruits (180 to 315 kg). At present, guava is propagated mostly from seeds.

Seasons of Harvest

In Uttar Pradesh and other parts of North India, guava flowers twice a year, once in February (called Ambe-bahar) and again in June (called Mrig-bahar) and yields fruits during July-September and November-January respectively.

The Ambe-bahar fruits (being ripe in rainy months) are found to be generally insipid and watery and also do not keep well, whereas Mrig-bahar fruits are excellent in quality. In most parts of India, therefore, Ambe-bahar crop is avoided by withholding irrigation from February to middle of May.

In West and South India, guava flowers thrice in a year in February, June and October and bears fruits almost throughout the year.

Cold Storage

Ripe guava fruits can be stored at about 47°F to 56°F for about two weeks without decay. Cold storing of guava is still to be attempted on a commercial scale in the country.

Grade Standards

No grade standards have been formulated so far for guava.

CHICKOOS (SAPOTA)

Harvesting

The chickoo fruit is perfectly mature and ready for packing when the brown scurf begins to drop from its skin. At this stage it presents a dull, orange colour in contrast to the potato brown of the immature fruit. Immature fruits give a green streak if scratched with finger nails, whereas mature fruits give a yellow streak. Mature fruits should not be allowed to ripen on the tree as they would either drop down or may be spoiled by birds. Mature fruits should be picked with their stalks still hard and green.

Ripening

Fruits ripen and soften within five days after picking if kept in a basket in a warm room. During storage, the milky latex altogether disappears and the fruit becomes sweet and edible. The chickoo fruit keeps in good condition for seven to eight days from the date of picking.

The Carbohydrate metabolism of Achras sapota fruit

During ripening, the pulp to peel ratio of the fruit of Achras sapota increases until full ripeness. This increase is due to both the seepage of water and the latex from the peel to the pulp. The bemicellulose contents of the fruit, even as the total alcohol insoluble matter, decrease as the fruit matures. Part of this polysaccharide is converted and thus enters into the carbohydrate metabolism, as the ripening progresses. During this period the alcohol insoluble matter progressively increases and the greatest increase is in the sucrose, glucose and fructose contents of the fruit until the full ripe stage is attained. On further over ripening, the sucrose content decreases due to inversion into glucose and fructose which increase at this stage.

Grade and quality

The relationship between fruit size and seed number, seed weight and sugar content was examined in fruit representing each of the 4 grades under which Sapodilles were sold in the local market. Uniformly high positive correlations were obtained, between fruit weight and seed weight and sugar content. A negative correlation existed between fruit weight and its length/diameter ratio. These results suggest that attempts to prcduce seedless sapodilles may succeed only at the expense of size.

Storage

Cheema & Karmakar (1939) and Karmakar & Joshi (1940) reported that it ripens satisfactorily at 52 and 56°F, but not at 45,°and remains good for 5 weeks, while ripe fruit can be kept for about 6 weeks at 32 or 35°F.

K.K. Singh and Mathur (1954) found they could keep full grown hard fruits eight weeks at 35-38°F, after which they could be kept not more than 5 days. During storage the ascorbic acid content, which was not high at the beginning, decreased rapidly.

The fruit is used almost entirely as a dessert fruit, but it is reported (Anon, 1954) that it can be canned. The product is said to be delicious and retains the characteristic flavour.

The results of the storage trials of chickoo fruits from the Baroda State showed that the fruit kept at temperatures 32°F to 45°F did not ripen satisfactorily, though it remained in hard and sound condition for forty days. The fruit of the B stage maturity ripened normally at 52°F and remained in good condition for five weeks. The fruits of

both the A and B stages of maturity ripened well at 56°F and remained in good condition for about a month. It has been shown that the green chickoo fruit can be kept for one month at a temperature between 40° and 45°F, after which they ripen normally on removal from the cold storage.

Fully matured unripe fruits are to be brushed to remove scraf on the surface of the skin and packed in carton or cardboard box in dozens. They are stored at;

Unripe hard Chickoos

39-42°F with 85-89% R.H. for 45 days.
42-45°F with 85-90% R.H. for 28-30 days.
They take 4-6 days for ripening at 80-90°

Ripened Chickoos

32-35°F with 85-90% R.H. for 5 weeks with 3-4 days of post storage life at R.T.

If removed from 32-35°F one week earlier best storage life would be longer by about 1-5 days.

Disease

Sapota is remarkably free from any pests or diseases. However, Bacillus cereus is reported to affect this crop, resulting in extensive breakdown of internal cell structure of the fruit.

A micro-organism that seems to be completely new was isolated from A. sapota and it was temporarily called black yeast.

Home studies on micro-organisms associated with Achras Sapota L have been carried out in the University of Bombay. The following table indicates the nutritive value of the fruit.

Nutrititive value of Chickoos (Sapota)

(per 100 g. of edible portion)

	VARIETY			
	Sapota Cricket ball (Nilgiris)	Sapota Bombay (Chickoo)	Sapota Hydera-bad (Chickoo)	Sapota Punjab (Chickoo)
1. Moisture (g)	77.7	71.4	72.8	73.1
2. Protein (g)	0.5	1.1	0.8	0.5
3. Fat (g)	0.6	1.2	1.9	0.7
4. Fibre (g)	0.6	--	2.0	3.9
5. Minerals (g)	0.5	0.5	0.6	0.4
6. Other Carbohy-drates (g)	18.9	25.8	22.3	21.4
7. Calories	83	113	110	95
8. Calcium (mg)	30	30	31	20
9. Phosphorus (Total) mg.	10	72	14	10
10. Iron (Total) mg.	0.5	6.7	0.1	0.6
11. Potassium (mg)	..	..	269	..
12. Copper (mg)	..	..	0.36	..
13. Vit. A (I.U.)	31	500	117	..
14. Thiamine (mg)	0.02	0.01	..	..
15. Riboflavin (mg)	0.04	0.01	..	..
16. Nicotinic acid (mg)	0.06	0.2	0.1	0.8
17. Vit.C (mg)	1	10	6	58

Source: Central Food Technological Research Institute, Mysore.

GARDEN PEAS

Varieties

Lincoln or Greenfeast (Darantia Kaip) - It is an English late variety mostly grown in North India. The pods are dark, green, sickle-shaped and are ready in 100 days. The plants are dwarf to medium tall and single podded. Usually, seeds are wrinkled and rather small.

Little Marvel - It is an early dwarf variety producing medium-sized, thick and well filled pods. The peas are sweet and the shelled yield is high. The seeds are wrinkled.

Kanawari or Simla - It is mostly grown in the Simla hills and also in Ambala (Punjab) and Nainital (U.P.). The seeds are smooth and white, The plants are rather tall, the pods are of good size and usually borne singly.

Darjeeling - This variety is cultivated mainly in the Darjeeling hills and Sikkim. The seeds are smooth and light brownish in colour. The pods are borne mostly in pairs with 7 to 9 bold peas each.

Telegraph - It is a tall, greenish, wrinkle-seeded variety. The pods are borne mostly in pairs, and hold 6 to 8 bold sweet peas each. This variety is generally cultivated in the plains of West Bengal.

N.P. 29 - It is a wrinkle-seeded variety developed by the Indian Agricultural Research Institute. It is a self-staking late fruiting type, producing double pods. The variety is sweet. The shell-cut percentage is reported to be very high, being nearly 50.

Early Badger - It is a foreign variety introduced from U.S.A. and is specially suited for sowing in October when the weather cools down a little. It is a dwarf, wrinkle-seeded variety which gets ready for the first picking in 60 to 65 days after sowing. The pods are borne mostly singly. Well filled pods, boldness of seed and sweetness of the green peas are its special merits. It gives out a shell percentage of 40.

Lucknow Bonia - It is a dwarf, white, smooth seeded variety producing short pods usually singly commonly grown around Lucknow (U.P.). It is suitable for early sowing.

Early Giant - This is an early variety. The plants are tall and pods very big, well filled (8 to 9 shiny peas). The seeds are creamy green, wrinkled and sweet. The shelling percentage is 50. This variety is ready for harvest within 60 days if sown in early October. It yields about 83 quintals per hectare.

Aldeman - This is an excellent variety and picked within 75 to 80 days of sowing. The pods are about 9 cm. long and are straight. Each pod generally contains about 8 to 10 seeds which are wrinkled. The seeds are shiny and sweet. It is a tall variety and generally givesa yield of about 111 quintals per hectare.

No. 5301 - This is early variety harvested in 60 to 65 days after sowing. The pods are 7 cm. long and are well filled with bold grains. The pods are borne singly and the shelling percentage is 50. The average yield of this variety is about 46 quintals per hectare.

Seasons of Harvest: In the plains, the main season of harvesting garden peas starts from December and lasts till March. In Mysore, however, the season is longer, extending from July to January. In the hills of Uttar Pradesh, Punjab, Himachal Pradesh and West Bengal peas are harvested from March to November in three stages, viz., (i) March to May, (ii) June to August, and (iii) September to November, the first one being the most important period of production.

FRENCH BEANS

Varieties

Giant Stringless - This is an early variety. It is bushy and green podded. The pods are medium to large sized, long, slightly curved, thick, tender, meaty, stringless and highly productive. The seeds are glossy and yellowish brown in colour.

Kentucky Wonder - It is a late variety, green fleshy podded and is a good climber. The pods are large and curved, round, thick and meaty with light brown seeds.

Pencil Pod - Pods are round, long, fleshy, tender and sweet. It is a heavy yielder, with 4.5 tonnes of green pods per hectare.

Selection 34A - This is the highest yielder giving about 67 quintals per hectare. Its pods are long and flat.

Seasons of Harvest

In the plains, french beans are usually harvested during October to December, whereas in the hills harvesting is done from June to September, the peak periods of production being November to December and July to August respectively.

TOMATOES

Varieties

Scarlet Globe	Colour deep; globe shaped and heavy yielder.
Early Red	Colour bright scarlet; Medium Size; Matures early.
Bonny Best	Light red; Small size; Good shape; Fairly solid; Heavy yielder.
Pondrosa	Purple colour; Big size; Tender skin; Solid; Heavy yielder.
Large Red	Colour red; Size large; Poor keeping quality.
Marglobe	Club shaped; Large sized; Colour deep scarlet; Skin thick, Fleshy and juicy.
Seoux	Whitish green when unripe and red coloured when ripened; Shape round, size medium to large; Smooth and uniform; Early variety, fit for spring planting.
Pusa Ruby	Early variety; Red colour; Medium size; Heavy yielder; Fruit ripens in 60 days, Performs well as kharif crop.
Pusa Red Plum	Colour uniform red, Shape round; Rich in vitamin C and Sugar, Fleshy and juicy; Good for table purposes; Fruits are borne in clusters on the plant; Early variety; Good as autumn and winter crop; Suitable for canning.
Marglobe	Mid-season variety; Plants grow large, vigorous and erect; Fruits are large, globular; Smooth thick walled, solid Colour scarlet; Less seed, Mildly acidic and Fair keeper.

Varieties

Best of All	Mid-season variety, yielding large bunches; Fruits are smooth, Solid. Less seeds; Colour scarlet red.
Indian Red Pear	Mid-season variety, Colour scarlet red; Size medium, Fruits in heavy clusters; Thick walled, meaty, solid, mild flavour, stands transport well.
King Number	Main season variety, Small fruits, oblong in shape with longitudinal ridges; Thick skinned, Colour deep scarlet; Fleshy, Mild and acidic; Less seeds, Fruits in clusters; Stands long distance transport.
Ox-Heart	Fruit is pointed at the blossom end; Medium sized, Shape like that of the heart; Fleshy, Less seeds; Keeping quality is good; Weighty, Bears in bunches; Can keep well for three to four days after ripening.
Pearson	Large sized fruits, round in shape; Good keeping quality, can keep well for 4 to 5 days after ripening; Juicy type, Bears in bunches of 4 to 5 fruits.
Augusta	Small sized fruits; Bears in bunches of 8 to 10 fruits.
Jubilee	Colour is yellow, Thick skinned, fleshy, juicy; Less of seeds. Tasty.
Marglobe (Selection)	Big red fruit, wilt resistant, yielding about 15 to 18 tonnes per hectare; Introduced by the Agricultural Department of Maharashtra in Maharashtra State.

Solid Red (Selection)	Medium sized red fruit, Good keeping quality; Yields about 12 to 15 tonnes per hectare.
No. 53-548- Direct introduction from USA	It has biggest fruit, Highest yielder, Yields about 20 tonnes per hectare; Keeping quality is poor.

Seasons of Sowing and Harvesting

Sl. No.	State	Region	Period of nursery	Time of transplanting	Harvest time	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Andhra Pradesh	Whole State	Middle of June to mid-July	Middle of September to November		
		-do-	Beginning of January to beginning of February	Beginning of February	Beginning of April to beginning of May	
2.	Maharashtra	Kolaba area	Beginning of October to middle of November	Middle of November	Middle of January to middle of February	
		Poona area	June and July	August and September	October and November	Rainy season crop
			September to December	October to January	December and January	Winter crop
					February and March	Summer crop
		Nasik area	June to December (Nurseries spread over)	July to January (Spread over)	September to March (Spread over)	
3.	Bihar	Whole State	June to November (Spread over)	July to December (Spread over)	September to March (Spread over)	
4.	Madras	Whole State	November to January February to April July to August	December to February April to June August to September	March to May complete May to July October to January	
5.	Madhya Pradesh	Whole State	Middle of May to September	June to September	September to end of March	
6.	Uttar Pradesh	Hill area	Febraury to March	April to May	June to September	
		Plains	June to July	August to September	Middle of October	

Contd.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)
7.	West Bengal	24-Parganas Murshidabad Howrah, Hooghly distts	August to middle of October	September to November	December and February	
		Midnapore, Bankura, Birbhum, Burdwan	September to November	October to November	December to February	
		Jalpaiguri	September to October	October to November	December to February	
		Darjeeling	September March and April December	October April and May January	November June and July March	
		Cooch Bihar Malda	September to October -do-	October to November -do-	December to February -do-	
		West Dinajpur	September	October	January	
8.	Punjab	Plains Hills	July to August Mid-March to Mid-May	August to September April to June	October to November June to August	
9.	Mysore	Whole State	May to June	June to July	August to September	
10.	Assam	Hills Plains	February to March August to September	April to May September to October	June to August December to February	
11.	Orissa	Whole State	July to September	August to October	October to December	
12.	Gujarat	Ahmedabad area	July to August	September to October	November to January	
13.	Rajasthan	Whole State	May to June	July to August	September to October	

Contd...

(1)	(2)	(3)	(4)	(5)	(6)	(7)
14.	Himachal Pradesh	Hill areas	May	June	August to September	Rainy season crop
15.	Tripura	Whole State	August end to September end	End of September to end of October	December to February	
16.	Jammu & Kashmir	Whole State	April	May	July to September	
17.	Delhi	Whole State	June and July	July and August	September and October	
			Middle of August	Middle of September	November	
			Middle of October	Middle of November	January	
18.	Kerala	Whole State	June	July	September	

CAULIFLOWERS

Kunwari or Kuari: This is one of the early bearing varieties. Thick white flower is of more than 15 cm. in diameter. Plant is of medium height of about 45 cm. Leaves are broad like those of the snowball variety. It matures in 2½ months. Seedlings should be transplanted when they are 4 to 5 weeks old. Otherwise, flowers will be of small size. The crop can be grown in the summer months of March and April also.

Early White: Early crop, comes to harvest in 2½ to 3 months, size of flower is 10 to 13 cm; can keep well for 3 to 4 days.

Indian Snowball: Early crop matures in 3½ to 4 months. The average size of flower is 18 cm. and can be kept for 8 days with care under ordinary conditions.

Katki or Pusa Katki: Flower is white in colour and is of the size of 10 to 13 cm. in diameter - plant is short and takes two months for flowering. Leaves are straight and oblong.

Aghani or Agahni: Main season crop. Flower is 15 cm. in diameter and light yellow in colour. Plant 60 cm. high - leaves broad and oblong.

Giant Snowball: Plant is just about 60 cm. high. Leaves are broad, long and tender. Gives flower after eleventh week of transplantation. Flower is white and light and is covered by its inner leaves. Size is about 20 cm.

Holland No. 16: Plant is more than 60 cm. high. Leaves are straight and oblong with stiff structure. Colour of flower

is white - diameter of flower is about 20 to 30 cm. - flower should be cut earlier as otherwise it gets discoloured and small leaves come out from flowers and taste is spoiled. Taste of flower is sweet.

Seasons of Harvest

In the plains, the early varieties of cauliflower are harvested from middle of October to middle of January. Mid and late varieties are harvested during January and February. In the hills, the crop is available between August and November.

CABBAGES

Varieties

Golden Acre: Early; heads very uniform, solid and round, short stemmed, size of head 15 to 23 cm; greenish-white colour, good taste, matures in 75 days after transplantation, good keeping quality; suitable for processing.

Early Drum Head: Early; matures in 75 to 80 days after transplantation; uniform, large, flattened or drum shaped, solid head, short stemmed, small frame, few outer leaves, keeps good.

Pride of India: Early; heads uniform, solid, round, short-temmed; matures within 75 days after transplantation, size of head 20 to 25 cm., weight 1 to 2 kilograms, good keeping quality.

Late Drum Head: Normally transplanted from September to January - matures after 100 days of transplantation; weight up to five kilograms, flat and round, diameter of the head is from 20 to 30 cm.

Seasons of Harvest

In the plains, cabbage is harvested between December and April and in the hills between July and November.

FRESH FRUITS AND VEGETABLES
AREA AND PRODUCTION

(1)	(2)	(3)	(4)
4. Temperate fruits:			
i) Apples	7,425 (0.7)	49,190 (0.4)	Himachal Pradesh (8.8), Jammu & Kashmir (39.9), Madras (6.4), Punjab (14), Uttar Pradesh (28.4)
ii) Pears	2,485 (0.2)	32,690 (0.3)	
iii) Plums	1,600 (0.2)	11,240 (0.1)	
iv) Apricots	1,510 (0.1)	8,400 (0.1)	
v) Peaches	1,263 (0.1)	7,360 (neg)	
vi) Cherries	380 (Neg)	2,970 (Neg)	
Total temperate fruits	14,663 (1.3)	111,850 (0.9)	
5. Pineapples	7,830 (0.7)	75,650 (0.6)	Assam (43.4), Kerala (26.4), Orissa (4.7), Tripura (7.4), W. Bengal (8.8)
6. Grapes	2,265 (0.2)	44,350 (0.4)	Andhra Pradesh (6.2), Maharashtra (44.0), Mysore (32.2), Madras (13.6)
7. Guavas	58,230 (5.0)	656,110 (5.4)	Bihar (20.5), Gujarat (7.6), Maharashtra (9.6), Uttar Pradesh (41.9)
8. Papaya	16,050 (1.4)	329,420 (2.7)	Assam (9,3), Bihar (8.0), Gujarat (7.4), Uttar Pradesh (32.6), West Bengal (24.6)
9. Lychees	11,140 (1.0)	91,860 (0.7)	Bihar (76.0), Uttar Pradesh (5.2), West Bengal (13.4)
Total fruits	1,157,509	12,176,425	

ESTIMATED AREA UNDER AND PRODUCTION OF SELECTED VEGETABLES IN INDIA

(1961-62)

Vegetables	Area (hectares) (Figures in brackets show percentage to the total)	Production (tonnes) (Figures in brackets show percentage to the total)	Important producing States (Figures in brackets show percentage of production)
(1)	(2)	(3)	(4)
1. Potatoes	368,700 (56.5)	2,767,000 (50.3)	Bihar (20.4), Uttar Pradesh (24.2), West Bengal (26.4)
2. Tomatoes	41,600 (6.4)	464,480 (8.4)	Andhra Pradesh (14.5), Bihar (12.9), Maharashtra (1.25), Madhya Pradesh (8.8), Madras (8.1), Punjab (10.0), Uttar Pradesh (11.2), West Bengal (6.9)
3. Cole crops root vegetables:			
i) Cauliflowers	38,160 (5.8)	413,240 (7.5)	Bihar (7.5), Mysore (10.7), Maharashtra (9.4), Punjab (15.0), Uttar Pradesh (19.7), West Bengal (10.1)
ii) Cabbages	21,390 (3.3)	288,010 (5.2)	
iii) Knol Khol	5,030 (0.8)	57,710 (1.0)	
iv) Carrots	10,770 (1.6)	141,500 (2.6)	
v) Turnips	4,840 (0.7)	58,020 (1.1)	
Total cole crops and root vegetables	80,190 (12.2)	958,480 (17.4)	

(1)	(2)	(3)	(4)
4. Garden Peas	38,120 (5.8)	170,710 (3.1)	Bihar (13.1), Maharashtra (4.8), Punjab (11.4); Uttar Pradesh (45.9), West Bengal (7.8)
5. French Beans	3,860 (0.6)	23,450 (0.4)	Andhra Pradesh (14.5), Gujarat (6.3), Mysore (24.1), Maharashtra (15.8), Madras (10.2), West Bengal (6.1)
6. Onions	120,570 (18.5)	1,121,790 (20 4)	Andhra Pradesh (13.4), Gujarat (7.2), Madras (11.3), Madhya Pradesh (11.1), West Bengal (7.0)
Total Vegetables	654,040	5,505,910	

Source: Directorate of Marketing and Inspection, Nagpur

v) GRAPES

(1965-66)

States	Production (Tonnes)
Maharashtra	50,000
Mysore	50,000
Andhra Pradesh	20,000

Grapes - yields of Selected Varieties

Variety	Yield/hectares (Tonnes)
Bokhri or Pachadrakshai	45
Khandari	9
Thomson seedless	9
Gulabi (similar to Muscat)	9
Selection 7	34
Bangalore purple	17
Anab-e-Shahi	45
Pusa seedless	9

vi) TEMPERATE FRUITS

(1961-62)

PEARS

	Hectares	Tonnes
Punjab		
Amritsar	490	6,720
Gurdaspur	80	1,120
Ferozepur	60	840
Others	100	1,340
	730	10,020
Madras		
Nilgiris	223	2,200
Kodaikanal	357	3,600
	580	5,800
U.P.		
Nainital	288	3,315
Almora	172	3,165
	460	8,480
Jammu & Kashmir		
Baramulla	110	1,540
Anantnag	80	1,120
Srinagar	60	840
Jammu	30	420
Others	40	560
	320	4,480

Contd...

Assam		
United K & J Hills	140	1,020
West Bengal		
Darjeeling	90	520
Himachal Pradesh		
Kangra	80	1,120
Mahasu	40	746
Others	20	374
	140	2,240
Delhi		
Delhi	23	130
PLUMS		
Uttar Pradesh		
Nainital	405	1,500
Almora	255	940
	660	2,440
Madras		
Nilgiris	65	320
Kodaikanal	205	1,000
	270	1,320
Jammu & Kashmir		
Srinagar	60	840
Jammu	50	700
Anantnag	35	490
Baramulla	25	350
Others	30	420
	200	2,800

Contd....

Punjab		
Ferozepur	40	360
Patiala	20	180
Ambala	20	180
Amritsar	20	180
Gurdaspur	20	180
Others	64	590
	184	1,670
Himachal Pradesh		
Mahasu	85	1,190
Kangra	16	140
Others	55	770
	156	2,100
West Bengal		
Darjeeling	70	260
Assam		
J & K Hills	50	510
Delhi		
Delhi	10	140
PEACHES		
U.P.		
Nainital	460	2,113
Almora	360	1,657

Contd....

Jammu & Kashmir		
Srinagar	70	635
Baramulla	55	520
Anantnag	45	425
Others	50	470
	220	2,050
Punjab		
Rohtak	40	275
Ferozepur	20	140
Patiala	20	140
Gurdaspur	20	140
Others	30	205
	130	1,900
Himachal Pradesh		
Kangra	20	140
Mahasu	48	336
Others	12	84
	80	560
Madras		
Nilgiris	8	40
Kodaikanal	2	10
	10	50
Assam		
K & J Hills	3	30

Contd.....

APRICOTS

Uttar Pradesh		
Nainital	675	3,118
Almora	365	1,692
	1,040	4,810
Jammu & Kashmir		
Srinagar	95	890
Anantnag	80	745
Baramulla	65	605
Others	60	560
	300	2,800
Himachal Pradesh		
Kangra	40	192
Mahasu	75	337
Others	25	113
	140	642
Punjab		
Punjab	10	48
West Bengal		
Darjeeling	20	100

vii) GUAVAS

(1961-62)

Sl. No.	State	Area (Hectares)	Production (Tonnes)
1.	Uttar Pradesh	24,780	2,75,100
2.	Bihar	11,210	1,34,800
3.	Madhya Pradesh	5,530	44,270
4.	Maharashtra	4,600	63,210
5.	Punjab	3,870	35,650
6.	Gujarat	2,690	49,540
7.	West Bengal	1,560	20,090
8.	Mysore	810	7,440
9.	Andhra Pradesh	680	8,000
10.	Delhi	610	5,600
11.	Rajasthan	560	4,460
12.	Assam	480	2,450
13.	Orissa	320	1,630
14.	Tripura	200	410
15.	Jammu & Kashmir	170	1,590
16.	Madras	100	1,200
17.	Others	60	670
	Total	58,230	6,56,110

viii) LYCHEES

		1961-62	
		Area (Hectares)	Production (Tonnes)
1.	Bihar	8,380	69,780
2.	West Bengal	1,640	12,360
3.	Uttar Pradesh	620	4,770
4.	Punjab	210	1,150
5.	Assam	200	1,530
6.	Tripura	200	1,250
7.	Orissa	160	1,020
	Total	11,410	91,860

Estimated Area and Production of Bihar*

Districts	1964-65	1965-66	1966-67
(i) Muzaffarpur area in acres	18,000	18,250	18,425
Production in tonnes	2,70,000	2,73,750	2,76,375
(ii) Champaran area in acres	6,000	6,150	6,250
Production in tonnes	90,000	92,250	93,750
(iii) Darbhanga area in acres	4,500	4,600	4,680
Production in tonnes	67,500	69,000	70,200
(iv) Other districts of the State			
Area in acres	6,000	6,039	6,182
Production in tonnes	90,000	90,585	94,550
Total Area in acres	34,500	35,039	35,537
Total Production in tonnes	3,17,500	3,25,585	3,34,875

*Source: Estimates of Government of Bihar.

ix) ONIONS

(Average of 1957-58 to 1961-62)

State	Area (hectares)	Yield per Hectare (tonnes)	Production ('000 tonnes)
Maharashtra	21,740	14.2	3,08
Madras	13,248	10.8	1,43
Andhra Pradesh	15,022	9.4	1,42
Gujarat	6,386	14.6	93
Madhya Pradesh	8,452	10.5	89
West Bengal	8,872	8.3	74
Mysore	13,708	5.2	71
Punjab	7,336	8.3	61
Other States	22,798	5.3	1,21
Total	1,17,562	9.4	11,02

x) POTATOES

A: Area in '000 Hectares
P: Production in '000 Tonnes

State	1964-65* A	1964-65* P	1965-66* A	1965-66* P	1966-67@ A	1966-67@ P
Andhra Pradesh	0.5	2.1	0.6	2.0	0.5	1.4
Assam	36.9	154.7	39.4	115.6	39.0	225.8
Bihar	84.6	719.8	96.7	788.4	93.2	752.2
Gujarat	4.4	62.5	2.5	41.5	3.8	37.1
Haryana	(a)	(a)	3.0	45.7	3.2	48.7
Jammu & Kashmir	0.7	1.6	0.7	1.3	0.8	2.5
Madhya Pradesh	14.0	167.7	13.8	111.6	13.2	87.2
Madras	6.5	40.7	7.4	57.2	8.3	62.3
Maharashtra	14.9	66.1	13.0	50.2	12.6	48.3
Mysore	7.7	32.7	6.9	21.9	10.1	37.6
Orissa	29.7	198.2	30.8	317.3	30.3	313.9
Punjab	18.1(b)	284.7(b)	14.6	235.4	14.6	235.4
Rajasthan	1.8	5.9	1.7	4.6	1.6	3.5
Uttar Pradesh	124.9	1,088.7	146.9	1,341.6	142.5	891.3
West Bengal	71.0	796.4	82.1	859.7	75.8	642.0
Delhi	0.2	1.5	0.2	1.6	0.2	1.6
Himachal Pradesh	12.3(b)	30.0(b)	17.1	49.5	18.9	56.8
Tripura	2.5	14.6	2.8	15.1	2.6	14.6
Total (incl. others)	430.7	3,667.9	480.2	4,060.2	471.2	3,462.2

(a) included against Punjab.
(b) relates to the set-up before November 1, 1966.

*Partially revised estimates.
@final estimates.

xi) TOMATOES

(1961-62)

States	Area (Hectares)	Production ('000 Tonnes)
Andhra Pradesh	6,520	67.4
Maharashtra	5,020	57.8
Bihar	4,320	59.7
Madras	4,280	37.6
Madhya Pradesh	4,130	42.0
Uttar Pradesh	3,800	52.1
West Bengal	3,400	32.1
Punjab	2,520	46.5
Total (incl. others)	41,600	464.5

xii) CAULIFLOWERS

(1961-62)

Sl. No.	State/Territory	Area (Hectares)	Production (Tonnes)
1.	Uttar Pradesh	11,200	83,600
2.	Mysore	7,210	72,120
3.	West Bengal	3,670	34,250
4.	Punjab	3,250	69,940
5.	Bihar	3,040	41,990
6.	Orissa	1,640	9,310
7.	Assam	1,590	23,800
8.	Madhya Pradesh	1,550	15,770
9.	Maharashtra	1,500	16,500
10.	Rajasthan	1,070	9,840
11.	Andhra Pradesh	1,000	9,810
12.	Delhi	490	8,960
13.	Gujarat	330	4,510
14.	Madras	280	6,900
15.	Others	340	5,940
	Total	38,160	4,13,240

xiii) CABBAGES

(1961-62)

Sl. No.	State/Terriroty	Area (Hectares)	Production (Tonnes)
1.	West Bengal	4,970	53,220
2.	Orissa	2,460	18,650
3.	Uttar Pradesh	2,200	50,850
4.	Maharashtra	2,000	20,660
5.	Mysore	1,760	17,640
6.	Assam	1,480	24,000
7.	Andhra Pradesh	1,150	9,140
8.	Punjab	1,030	24,420
9.	Gujarat	920	8,530
10.	Madhya Pradesh	920	19,200
11.	Bihar	920	16,910
12.	Madras	740	15,560
13.	Rajasthar	420	3,900
14.	Himachal Pradesh	150	3,110
15.	Delhi	140	2,940
16.	Others	130	2,280
	Total	21,390	2,88,010

xiv) PEAS

(1961-62)

Sl. No.	State	Area (Hectares)	Percentage share in the total area	Production (Tonnes)	Percentage share in the total production	Average yield per Hectare (Tonnes)
1.	Uttar Pradesh	16,900	44.3	78,370	45.9	4.6
2.	Bihar	6,070	15.9	22,390	13.1	3.6
3.	Punjab	3,510	9.2	19,420	11.4	5.5
4.	West Bengal	3,010	7.9	13,370	7.8	4.4
5.	Maharashtra	2,200	5.8	8,150	4.8	3.7
6.	Rajasthan	1,570	4.1	8,700	5.1	5.5
7.	Delhi	1,480	3.9	6,810	4.0	4.6
8.	Gujarat	1,200	3.2	4,450	2.6	3.7
9.	Mysore	640	1.7	2,560	1.5	4.0
10.	Himachal Pradesh	610	1.6	3,360	2.0	5.5
11.	Assam	320	0.8	740	0.4	2.3
12.	Jammu & Kashmir	180	0.5	1,010	0.6	5.6
13.	Andhra Pradesh	180	0.5	690	0.4	3.8
14.	Madras	160	0.4	600	0.4	3.7
15.	Others	90	0.2	90	neg.	1.0
	TOTAL	38,120	100.0	1,70,710	100.0	4.4

xv) FRENCH BEANS

(1961-62)

Sl. No.	State	Area (Hectares)	Percentage share in the total area	Production (Tonnes)	Percentage share in the total production	Average yield per Hectare (Tonnes)
1.	Mysore	940	24.4	5,640	24.1	6.0
2.	Maharashtra	800	20.7	3,700	15.8	4.6
3.	Punjab	430	11.1	2,940	12.5	6.8
4.	Gujarat	400	10.4	1,480	6.3	3.7
5.	Andhra Pradesh	340	8.8	3,400	14.5	10.0
6.	Madras	240	6.2	2,400	10.2	10.0
7.	West Bengal	240	6.2	1,420	6.1	5.9
8.	Madhya Pradesh	150	3.9	710	3.0	4.7
9.	Jammu & Kashmir	110	2.8	630	2.7	5.7
10.	Uttar Pradesh	80	2.1	450	1.9	5.6
11.	Himachal Pradesh	80	2.1	450	1.9	5.6
12.	Bihar	50	1.3	230	1.0	4.6
	TOTAL	3,860	100.0	23,450	100.0	6.0

FRESH FRUITS AND VEGETABLES
EXPORTS

ANNEXURE A-19

EXPORTS OF FRESH FRUITS AND VEGETABLES

Quantity: Tonnes
Value: Rs '000

Product	1965-66		1966-67		1967-68	
	Qty	Val	Qty	Val	Qty	Val
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mangoes	636	853	810	1,126	1,072	1,818
Pineapples	16	22	1	2	5	7
Citrus Fruits:	138	157	205	318	240	416
a) Oranges	91	90	180	275	169	298
b) Limes & Lemons	46	64	22	40	64	110
c) Grapefruits	Neg	Neg	3	3	3	3
d) Others	1	3	-	-	4	5
Bananas	8,931	3,768	8,062	3,721	2,813	1,928
Grapes	48	115	2	5	3	7
Apples	7	29	3	10	2	7
Berries	37	20	40	22	12	7
Apricots	52	77	8	16	3	10
Peaches	5	7	NA	NA	-	-
Pears & Quinces	8	3	NA	NA	Neg	Neg
Sapota (Chickoos)	5	5	4	4	9	18
Other tropical fruits	1	1	1	1	7	10
Other stone fruits	2	1	Neg	Neg	Neg	Neg
Pomegranates	4	22	4	10	4	9
Other unspecified fruits	287	433	94	190	197	571
Seed potatoes	Neg	Neg	11	20	-	-
Potatoes	2,173	1,065	977	588	547	465
Cabbages	Neg	Neg	1	1	2	2
Carrots, Turnips, Radish, Knol Khol	Neg	Neg	Neg	Neg	2	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Onions	98,830	25,226	91,919	44,357	103,362	41,831
Cauliflowers	3	4	1	1	1	2
Tomatoes, fresh	-	-	-	-	2	1
Vegetable temporarily preserved	Neg	Neg	Neg	Neg	-	-
Other fresh vegetables	721	582	751	605	1,649	1,639
Total:	111,904	32,390	102,894	50,997	109,932	48,750

Source: DGCI&S, Calcutta.

ANNEXURE A-20

EXPORTS OF FRESH FRUITS & VEGETABLES BY COMMODITIES & DESTINATIONS

Quantity: Tonnes
Value: Rs '000

Commodity/Country	1965-66		1966-67		1967-68	
	Qty	Val	Qty	Val	Qty	Val
Ceylon	62,809	16,398	55,224	24,113	50,146	20,698
a) Bananas	-	-	-	-	-	-
b) Mangoes	Neg	Neg	-	-	-	-
c) Other Fruits	243	172	97	78	-	-
d) Onions	61,951	15,622	54,863	23,329	55,146	20,698
e) Potatoes	-	-	-	-	-	-
f) Other Vegetables	615	604	264	706	-	-
Malaysia	29,551	8,016	18,542	11,310	17,664	7,655
a) Bananas	-	-	-	-	-	-
b) Mangoes	24	22	25	24	-	-
c) Other Fruits	-	-	-	-	-	-
d) Onions	29,525	7,991	18,517	11,286	17,661	7,653
e) Potatoes	-	-	-	-	-	-
f) Other Vegetables	2	3	Neg	Neg	3	2
Singapore	-	-	11,121	6,778	13,785	6,299
a) Bananas	-	-	-	-	-	-
b) Mangoes	-	-	13	24	6	11
c) Other Fruits	-	-	-	-	Neg	Neg
d) Onions	-	-	11,107	6,754	13,779	6,288
e) Potatoes	-	-	-	-	-	-
f) Other Vegetables	-	-	1	Neg	Neg	Neg

Commodity/Country	1965-66 Qty	1965-66 Val	1966-67 Qty	1966-67 Val	1967-68 Qty	1967-68 Val
Kuwait	6,474	2,773	7,231	3,638	6,248	3,919
a) Bananas	4,828	2,044	4,113	1,900	1,625	998
b) Mangoes	224	293	447	595	614	996
c) Other Fruits	24	20	37	28	15	16
d) Onions	1,217	237	2,492	954	3,642	1,494
e) Potatoes	Neg	Neg	Neg	Neg	Neg	Neg
f) Other Vegetables	181	179	142	161	352	415
Bahrain	3,158	1,001	3,552	1,758	4,025	2,124
a) Bananas	1,060	382	1,338	599	493	246
b) Mangoes	102	113	172	232	207	299
c) Other Fruits	60	52	92	98	55	59
d) Onions	1,867	389	1,905	775	3,029	1,284
e) Potatoes	8	3	-	-	Neg	Neg
f) Other Vegetables	61	62	45	54	241	236
Nepal	2,933	1,990	1,783	1,300	2,045	1,859
a) Bananas	49	46	5	6	9	10
b) Mangoes	3	3	9	14	5	5
c) Other Fruits	383	688	199	399	351	903
d) Onions	71	24	192	86	804	276
e) Potatoes	2,133	1,043	961	574	547	466
f) Other Vegetables	294	186	417	221	329	199

Commodity/Country	1965-66 Qty	1965-66 Val	1966-67 Qty	1966-67 Val	1967-68 Qty	1967-68 Val
Qatar Trucial Oman.	1,394	590	1,573	865	1,248	792
a) Bananas	648	254	1,108	535	372	197
b) Mangoes	88	122	69	107	86	141
c) Other Fruits	48	36	22	22	22	30
d) Onions	539	108	318	134	651	275
e) Potatoes	5	3	-	-	-	-
f) Other Vegetables	66	67	56	67	117	149
Aden	987	327	293	115	2,822	1159
a) Bananas	-	-	-	-	-	-
b) Mangoes	35	69	17	35	1	2
c) Other Fruits	7	10	-	-	Neg	Neg
d) Onions	799	162	276	80	2,821	1157
e) Other Vegetables	146	86	Neg	Neg	Neg	Neg
France	3	7	Neg	1	2,877	1427
a) Bananas	Neg	Neg	-	-	-	-
b) Mangoes	3	7	Neg	1	18	59
c) Other Fruits	-	-	-	-	1	5
d) Onions	-	-	-	-	2,857	1,363
e) Potatoes	-	-	-	-	-	-
f) Other Vegetables	Neg	Neg	-	-	1	Neg
UK	162	155	117	163	660	829
a) Bananas	-	-	-	-	-	-
b) Mangoes	47	75	28	61	86	202
c) Other Fruits	1	1	1	2	11	21
d) Onions	-	-	-	-	-	-
e) Potatoes	-	-	-	-	-	-
f) Other Vegetables	114	80	88	100	563	606
Other Countries	4,433	1,153	2,458	956	3,412	1,989
Grand Total	111,904	32,390	102,894	50,997	109,932	48,750

Source: D.G.C.I. & S., Calcutta.

BANANAS: PROGRESS IN EXPORTS FROM INDIA

Concrete achievements of exports of bananas as effected by the Co-operative Societies in Maharashtra and Gujarat States, who pioneered the export of bananas, are shown in table below:

Exports by the Co-operative Societies in Maharashtra State and Gujarat State

Year	Persian Gulf		West Pakistan		Total	
	Qty in Tonnes	Value in Million Rs	Qty in Tonnes	Value in Million Rs	Qty in Tonnes	Value in Million Rs
1962-63	5,328	1.49	5,941	1.69	11,269	3.18
1963-64	6,042	1.83	2,285	0.80	*10,730	3.60
1964-65	7,002	2.64	-	-	8,396	3.16

While these efforts in the export of bananas to Persian Gulf areas have been made by the Co-operative Societies in Maharashtra and Gujarat States, the first successful attempt in exporting bananas to U.S.S.R. was made by the State Trading Coporation in the year 1965, with the co-operation of the above Co-operative Societies. The State Trading Corporation contracted with Messrs. Prodintorg, Moscow for export of 1,000/1,200 tonnes of bananas to U.S.S.R. at Rs 745 per tonne C.I.F., in September-December, 1965 on experimental basis. To fulfil this contract three shipments were made. A brief account of each shipment is provided below.

First Shipment: The first shipment was made through a chartered vessel M.S. 'FRIGORA' on 23rd October 1965, from the Bombay port. The ship reached Odessa after

*This includes 2,403 tonnes of bananas shipped to Italy and U.S.S.R. but which did not reach the destination in good condition.

15 days on 8th November, 1965. 195.155 tonnes of bananas were delivered. There were three holds in the boat and the qualitative acceptance of bananas hold-wise was as follows:

Hold No	Accepted Good Quality	Rejected	
		Over ripe	Sub-standard
I	86.4%	11.9%	1.7%
II & III	84.8%	13.5%	1.5%

Second Shipment: The Second Shipment was made through the same chartered vessel M.S. 'FRIGORA' on 6th December, 1965 from Bombay port: but a small quantity of about 20 tonnes of bananas was also loaded on the Steamer at Magdella port, six miles from Surat which is easily accessible to the banana plantations in Bardoli. A total quantity of 300.839 tonnes was delivered at Odessa. The qualitative acceptance from this shipment was as follows:

Hold No.	Accepted Good Quality	Rejected	
		Sub-Standard	Over-ripe
I	88.3%	10%	1.7%
II & III	87.7%	10.2%	2.1%

Third Shipment: The Third shipment was made on 16th December 1965 through S.S. 'ALBANY' in which two holds had been hired. While the two previous shipments were done with hands packed in wooden creates, a part of it was packed in polythene bags. A total quantity of 449.903 tonnes was delivered at Odessa and qualitative acceptance was as follows:

Hold No.	Accepted Good Quality	Rejected	
		Sub-Standard	Over-ripe
II Hold	93.4%	5.3%	1.3%
IV Hold	94.5%	4.3%	1.2%

The result of examination of bananas packed in polythene bags stacked separately was as follows:

i)	Good bananas	88.7%
ii)	Sub-standard	9.1%
iii)	Over-ripe	2.2%

The cost of the three consignments of bananas consisting of 1,045 tonnes exported to the U.S.S.R. by the State Trading Corporation worked out to Rs 1.2 million C.I.F. against C.I.F. realisation of about Rs 0.7 million resulting in a loss of Rs 0.5 million which works out to a loss of Rs 451.6 for every tonne of bananas exported.

The main reason for the losses was the high ocean freight amounting roughly to Rs 600/- per tonne on the first and second shipments and approximately Rs 480/- per tonne on the third shipment and the high cost of wooden packing cases which works out to Rs 250/- per tonne.

The State Trading Corporation entered into an arrangement with the Co-operative Societies of Maharashtra and Gujarat States for the supply of bananas at the guaranteed price of Rs 300/- per tonne F.O.B. stowed basis with a no claim bonus of Rs 50/- per tonne to be paid in the event of goods arriving at the destination in good condition with the State Trading Corporation paying for the wooden cases each of which carried 11 kg of bananas. The rates accepted by the Co-operative banana growers should be considered as concessional for the experimental shipping and these prices would not hold good for another year.

CITRUS: DETAILS OF TRIAL EXPORTS

In February 1963, the Directorate of Marketing and Inspection despatched by ship from Bombay 2 cases of 223 oranges to the First Secretary (Commercial) Berne, Switzerland. The fruits were from early season crop and therefore had not developed the characteristic yellow colour. The total amount spent on despatch of this consignment was Rs 12,180. On arrival at destination, eight fruits were found to have been spoilt. The remaining were distributed among six of the most important wholesalers and importers in Switzerland. Some of these firms also distributed the fruits among their customers. The firms reported that they found the oranges easy to peel and separate into segments, of good size, attractive as a novelty, sweet in taste and agreeable in flavour. They all, however, complained against the green colour of the skin. It was also reported that some of the fruits, which were slightly unripe, had a bitter taste in spite of being very sweet. It was suggested by all of them that in order to compete with Spanish and Italian mandarins, the colour of the skin should be yellow.

Regarding the season when these oranges can be imported, opinion differed. Some of the firms believed that there would be no profitable market during the months November to February, when mandarins were arriving from Spain and Sicily. On the other hand, some firms thought that there might be difficulty in finding a market during the summer months because a large variety of fruits grown in Switzerland is available in abundance during that period. Besides, Swiss consumers are not accustomed to have mandarins during the summer months and if they are to be sold

during that period, an effort may have to be made to popularise them among the customers. One firm, M/s Frucht A.G. which was willing to import a trial consignment of 10 to 15 tonnes of Nagpur mandarins to be sold on commission basis, felt that the only season when they will be in a position to try these oranges would be the Charistmas season and, therefore, desired that the oranges should reach Switzerland by the end of November.

Two other firms, M/s Migros and M/s USEGO of Oltea, expressed a desire to try Nagpur oranges in February/March.

The loss involved in sending one ton of mandarin oranges to Switzerland by sea was estimated at Rs 890/- and on this basis the total loss involved in sending consignment of 10 tons was estimated at Rs 8,900/-. There was also the problem of sending oranges during November, by when the oranges do not develop the attractive colour and optimum taste.

The Nagpur Orange Growers' Cooperative Association Ltd., Nagpur had also sent some trial consignments of Nagpur oranges to Middle East and Singapore. During 1963-64, 540 cases weighing 77 tonnes of oranges were sent by ship to Middle East at a total cost of Rs 7,919/-. This transaction resulted in a net loss of Rs 3,673 (Rs 6.80 per case), since only Rs 4,246/- was received back as sale proceeds. During the same year, 30 cases were sent by ship to Singapore at a cost of Rs 653/-. This transaction also resulted in a loss of Rs 238.47 (Rs 7.93 per case).

Owing to the failure of the crop during 1964-65, no consignment was sent by the Association during this year. During 1965-66, however, the Association sent a further consignment of 600 cases of oranges to Persian

Gulf ports. This transaction again proved to be a failure and resulted in a loss of Rs 3,514/- (Rs 5.85 per case). The exports to Persian Gulf ports were effected through the Maharashtra Cooperative Federation and to Singapore through G. Atherton & Co., Calcutta. On account of the continuous losses suffered the NOGA is not enthusiastic about further despatches to foreign countries. The Association feels that that the prices realised for their consignments in the foreign markets were low even as compared with those obtained in the up-country markets in India.

FRESH PINEAPPLES: DETAILS OF TRIAL EXPORTS

The Directorate of Marketing and Inspection despatched by air a few trial consignments of Queen variety of pineapple to some European countries in 1965 to find out the export possibilities. Pineapples were collected from Kerala, Assam, and Tripura - the three important growing centres in the country. West Germany, Italy and Switzerland were selected for the trials. The fruits were consigned to the Indian Embassies at Bonn, Berne and Rome so that the fruits could be distributed amongst the leading fruit dealers in those countries and their response obtained about the size, taste, flavour, etc. of Indian Pineaples. The reports received from the Indian Embassies of Bonn, Berne and Rome indicated the following:

West Germany: The c.i.f. landed cost of Indian pineapple worked out to Rs 17.75 per fruit. Actually, pineapple imported from other countries was available in West Germany at Rs 8/- to Rs 10/- per fruit. The Indian pineapples were examined by M/s Heinrich Holbeck KG, leading importers of fresh fruits in Cologne. This firm reported that the quality of Indian pineapple compares well with Kenya variety which, however, is smaller in size. Consumers in West Germany usually prefer pineapples of average size weighing about 1 kg. each. During summer, there is competition from available fresh fruits like apples, oranges, etc. Other sources for pineapples are Ivory Coast and Canary Islands.

Assam and Tripura pineapples were examined on arrival at Frankfurt by Mr. Baron of M/s Baron, Gro Bmarkthalle. The taste of the Indian pineapple was found to be very satisfactory and Mr. Baron expressed the opinion that it would find good favour with the buying public. Pineapples are now being imported into West Germany in five sizes: The fruits that were sent as trial consignment were of the medium size. While this size would be suitable for hotels and restaurants, Mr. Baron felt that the German house-wife would prefer pineapples of smaller sizes. He also suggested some improvements in the packaging techniques. The best season for Indian pineapple in West Germany is from November till May.

Switzerland: The firm that tested the Indian pineapples reported that the appearance of the fruit was very good and that the fruits were very juicy. Preference was, however, expressed for pineapples of smaller sizes. The main season for sale of pineapple in Switzerland in November-January.

Italy: The fruits were given to a firm in Rome for ascertaining its opinion. The firm reported that the fruit was of good quality, but at the same time it was stated that prospects of importing fresh pineapple into Italy were not very good. Fresh pineapples are now being imported into Italy from Kenya and Brazil.

Mangoes - Details of Trial Exports

The State Trading Corporation of India Limited has an office in Rotterdam for concluding business deals and to follow up specific enquiries, emanating from Delhi.

During 1966 mango season, the State Trading Corporation had made intensive efforts in the UK market for the sale of fresh mangoes from India. Discussions were held with a number of corporate chain stores in England for exploring the possibilities of sale of fresh fruits through their selected outlets. M/s J. Sansburys, one of the biggest corporate chains in UK, showed interest in the import of fresh mangoes from India during 1966 mango season. STC entered into a contract with Sansburys for the export of 1,800 kgs. of Alphanso at a CIF price of 6 Sh. per kg. delivered at London by air. The supplies of 1,800 kgs were made in three instalments. While the first instalment reached safely, some damage was reported in the second and third instalments, containing 667 and 711 kgs each respectively. Discussions indicated that the damage was around 14% in the two lots delivered in the last two instalments. In lieu of this damage, STC agreed to collect 5 Sh. 6 d per kg (instead of agreed rate of 6 Sh. per kg) for the last two instalments. The total realisation in these transactions amounted to £ 506.10. A special package of 5 kg. was evolved by STC and the mangoes were sold under the brand name 'Raja Mangoes of India'. Sansburys were in general appreciative of the quality of the mangoes and had shown a definite desire to continue to get supplies from India. They, however, indicated that the price of 6 Sh. per kg. was slightly higher and had suggested that the price may be reduced to 4 Sh per kg. In view of the withdrawal of concessions by Air India on freight rates, it was not possible for STC to deliver mangoes even at the rate of 6 Sh. Hence no deliveries could be effected to Sansburys

during 1967, despite the efforts made by STC to get concessional freight rates from Air India. It is understood that the Air India has declined to offer any concession in this respect. The matter is being pursued by STC.

In addition, STC had also made efforts for supplying mangoes to London market by sea. The first sea shipment of mangoes, packed in tissue paper and cartons, reached Marseilles after 19 days. The damage caused in transit was reckoned at 10%. The mangoes were further transported from Marseilles to London by road which took three days to reach Covent Garden Market, London. On inspection, it was found that a further damage of 30% had taken place during these three days. In respect of second shipment despatched after the blockade of Suez Canal, the damage between Bombay and Marseilles was around 15% during a shipment period of 50 days. The damage in respect of mangoes transported from Marseilles to London was estimated at 95% during the three days' road journey. Consequently, mangoes after inspection were declared unfit for human consumption.

Against this background it has been considered necessary by STC to only air lift future shipments of fresh mangoes to European markets. The discussions held by STC with a few marketing consultants in UK also indicated that for the planned marketing of fresh mangoes into UK market, it would be necessary to work out a proper marketing plan. Accordingly STC had requested a few marketing firms in London to prepare a promotional plan for facilitating the sales of mangoes in UK market. A detailed programme for a period of five months worked out by a leading marketing company in UK, estimated the total expenditure on such a programme around £ 4,000. This included advertisements both in trade and consumer press as well as the distribution of point of sale material among selected retail outlets. The proposal is under the consideration of Government of India.

FRESH FRUITS AND VEGETABLES
PRICES

MONTH-END WHOLESALE PRICES OF SELECTED FRUITS AND VEGETABLES DURING 1965, 1966 AND 1967

I FRUITS

(Rupees per quintal/otherwise specified)

Commodity/Market		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
ORANGES													
Nagpur*(Medium)	1965	12.00	10.67	8.00	13.33	18.67	N.S.	N.S.	N.S.	5.33	5.33	N.A.	20.67
	1966	20.00	18.00	17.33	18.00	22.67	N.A.	N.A.	N.A.	14.67	16.67	21.33	16.00
	1967	18.67	19.67	19.00	20.67	24.10	N.A.	N.A.	N.A.	12.00	12.33	15.00	16.00
Calcutta (Darjeeling)	1965	15.00	20.00	12.00	14.00	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	13.00
	1966	13.00	19.00	19.00	18.00	18.00	22.00	N.S.	N.S.	N.S.	N.S.	13.00	14.00
	1967	17.00	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	16.00
Bombay(Superior)	1965	18.75	12.00	11.00	18.00	N.A.	48.00	30.00	21.00	21.00	24.00	18.00	18.00
	1966	16.00	24.00	30.00	33.00	36.00	36.00	42.00	30.00	27.00	29.17	11.11	17.00
	1967	22.00	30.00	27.00	30.00	39.00	36.00	27.00	24.00	27.00	45.00	20.00	20.00
Bombay(Inferior)	1965	14.60	11.00	10.00	16.00	N.R.	45.00	27.00	15.00	18.00	18.00	14.00	17.00
	1966	15.00	21.00	24.00	30.00	30.00	30.00	36.00	27.00	24.00	25.00	10.62	16.00
	1967	20.00	24.00	24.00	24.00	33.00	30.00	24.00	21.00	24.00	42.00	18.00	18.00
Madras(Sathugudi)	1965	20.00	15.00	14.00	N.A.	N.A.	N.A.	16.00	16.00	16.00	16.00	16.00	12.00
	1966	12.00	12.00	19.00	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	10.00	12.00	12.00
	1967	12.00	14.00	18.00	20.00	18.00	18.00	18.00	18.00	18.00	15.00	16.00	18.00
Madras(Medium)	1965	17.50	13.00	13.00	12.00	10.00	10.00	12.00	12.00	12.00	12.00	12.00	9.00
	1966	9.00	N.A.	14.00	N.A.	N.A.	N.A.	20.00	18.00	15.00	10.00	12.00	15.00
	1967	10.00	12.00	14.00	16.00	13.00	13.00	13.00	13.00	13.00	10.00	10.00	15.00

Commodity/Market		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bananas(Per 100 except Bombay)													
Nagpur*(Bhusaval)	1965	3.60	3.60	3.80	3.80	N.A.	N.S.	3.80	4.00	4.00	3.90	3.90	3.80
	1966	3.50	3.40	3.30	3.70	4.10	4.10	3.70	4.50	4.40	4.10	4.20	3.60
	1967	3.20	3.30	3.60	4.40	5.80	N.A.	5.20	5.20	4.50	4.50	4.70	4.00
Kodaikanal* (Red I)	1965	N.R.	9.00	10.20	10.00	10.00	9.00	8.00	9.00	10.00	12.00	12.00	N.R.
	1966	15.00	16.00	16.00	16.00	17.00	17.00	14.00	14.00	15.00	N.A.	N.A.	N.A.
	1967	15.00	15.00	16.00	17.00	19.00	10.00	11.00	N.R.	N.R.	N.R.	N.R.	13.00
Bombay(Khan Desh)	1965	29.50	30.00	31.00	30.00	32.00	26.50	33.00	27.50	22.00	21.50	28.50	30.00
	1966	29.00	30.50	30.00	34.00	34.50	31.00	35.00	40.50	27.00	26.50	26.00	23.00
	1967	27.00	29.00	34.00	41.00	42.50	29.00	43.50	48.70	38.70	37.50	43.70	33.70
Calcutta (Singapore)	1965	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.50
	1966	5.50	5.50	5.50	5.50	5.50	6.00	6.50	6.50	6.50	6.25	6.00	5.50
	1967	5.50	5.50	5.50	5.50	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00
Kanpur (Singapore)	1965	9.00	12.00	10.72	11.00	16.00	11.00	5.50	4.00	4.00	3.00	4.75	7.00
	1966	8.00	6.00	7.50	9.00	N.A.	N.A.	N.A.	8.00	11.00	8.50	8.50	9.00
	1967	N.R.	10.00	9.00	12.00	12.00	N.A.	N.A.	10.50	6.50	6.50	6.00	12.00
Apples													
Madras(Kashmiri)	1965	202.40	220.00	228.80	281.60	316.80	405.00	405.00	400.00	400.00	N.R.	144.00	144.00
	1966	105.60	105.60	170.00	200.00	210.00	230.00	250.00	200.00	175.00	175.00	200.00	200.00
	1967	240.00	240.00	N.A.	N.A.	N.A.	N.A.	341.18	294.12	294.12	488.25	382.35	382.35
Delhi	1965	300.00	350.00	425.00	525.00	562.50	637.50	300.00	350.00	375.00	N.R.	N.R.	312.50
	1966	312.50	300.00	287.50	350.00	450.00	750.00	200.00	N.A.	225.00	275.00	300.00	300.00
	1967	275.00	310.00	275.00	400.00	550.00	950.00	250.00	450.00	225.00	325.00	212.50	200.00

Commodity/Market		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Simla (Royal)	1965	400.00	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	400.00	400.00	400.00	412.50	475.00
	1966	500.00	500.00	500.00	N.A.	N.A.	N.A.	N.A.	N.A.	400.00	400.00	400.00	412.50
	1967	387.50	400.00	N.A.	N.A.	N.A.	N.A.	400.00	375.00	325.00	400.00	350.00	325.00
					II VEGETABLES								
Potatoes													
Nethepalayam* (Rasi)	1965	84.44	62.22	N.R.	51.11	51.11	46.66	48.88	46.66	40.00	46.66	45.55	62.22
	1966	61.11	47.77	53.33	56.67	75.00	73.34	54.38	53.89	60.00	87.78	106.67	115.56
	1967	95.56	87.78	65.00	62.20	71.00	80.00	71.00	71.00	77.60	63.20	91.00	80.00
Farrukhabad* (Military)	1965	36.25	33.75	37.50	N.A.	N.A.	N.A.	N.A.	N.A.	50.00	N.T.	50.00	27.50
	1966	22.50	31.25	N.T.	N.T.	N.T.	65.00	57.50	65.00	55.00	55.00	66.25	52.50
	1967	35.00	46.50	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	65.00	36.25
Patna(Desi)	1965	32.15	24.11	34.83	32.15	34.83	40.19	53.59	N.R.	45.55	45.55	56.26	29.47
	1966	24.11	24.11	21.43	32.15	29.47	48.23	48.23	48.23	53.59	56.25	61.62	42.87
	1967	24.11	29.47	37.51	53.59	69.66	66.98	69.66	72.34	83.06	83.06	85.74	53.59
Bombay (Madras)	1965	57.50	44.00	38.70	41.20	48.70	54.00	61.25	59.00	41.50	53.50	63.70	47.50
	1966	46.50	42.50	43.50	61.20	58.70	82.50	82.50	87.50	84.50	97.50	118.70	80.00
	1967	57.00	73.70	73.70	63.70	83.70	102.50	112.50	103.50	97.50	120.00	123.70	63.70
Delhi (Punjab Numbri)	1965	36.25	38.75	36.25	33.75	40.00	47.50	55.00	55.00	51.25	60.00	51.25	31.25
	1966	27.50	31.25	32.50	42.50	32 50	55.00	60.00	60.00	62.50	63.75	56.25	58.75
	1967	46.25	60.00	68.75	72.50	62.50	85.00	80.00	81.25	80.00	92.50	N.A.	47.50

Commodity/Market		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Onions													
Cuddapah(Bellary)	1965	14.9	14.11	N.R.	11.16	14.91	14.91	19.39	22.32	14.91	22.32	26.76	22.32
	1966	20.81	19.37	25.00	20.71	25.71	31.44	40.00	50.00	45.71	30.00	34.28	45.71
	1967	59.55	40.79	28.32	23.84	22.32	35.71	29.74	28.32	26.79	25.28	32.77	32.77
Bombay (Nasik)	1965	15.00	14.50	13.50	13.50	16.50	20.50	23.50	24.50	23.50	23.50	31.50	21.50
	1966	17.50	25.50	28.50	22.70	27.50	29.30	35.50	37.50	46.20	39.00	36.20	48.70
	1967	51.20	46.20	26.20	20.50	26.00	27.50	25.50	26.50	29.00	30.50	29.00	21.20
Calcutta(Bihar)	1965	26.80	23.70	26.80	19.00	27.50	N.S.	27.50	33.75	32.50	38.75	41.25	31.25
	1966	25.00	42.50	42.50	27.50	32.50	N.S.	N.S.	N.S.	N.S.	50.00	60.00	48.70
	1967	62.50	55.00	37.50	32.50	32.50	35.00	31.25	N.R.	27.50	30.00	45.00	35.25
Delhi	1965	23.75	22.50	16.25	18.75	17.30	13.12	22.50	26.25	27.50	26.50	38.75	33.75
	1966	27.50	33.75	37.50	25.70	17.50	20.00	21.25	30.00	40.00	45.00	53.75	52.50
	1967	53.75	55.00	40.00	17.50	15.00	15.00	22.50	17.50	17.50	20.00	20.00	35.00
Hyderabad	1965	22.00	18.00	17.00	11.20	13.70	16.25	20.50	24.80	N.R.	29.00	35.00	20.00
	1966	N.A.	N.A.	24.00	N.A.	23.50	26.00	31.50	48.20	27.00	33.25	39.00	58.07
	1967	43.00	37.00	25.00	20.00	23.00	31.00	31.00	26.75	28.50	29.35	32.00	27.00
Madras	1965	30.00	24.71	25.71	34.29	32.86	33.86	24.27	20.00	21.33	25.72	21.43	20.00
	1966	24.29	25.71	34.29	41.43	45.71	71.43	62.86	62.86	60.00	100.00	88.57	102.86
	1967	64.28	61.43	47.14	57.14	50.00	64.28	40.00	30.00	20.57	38.57	42.85	30.00
Rajahmundry	1965	N.R.	20.00	22.50	20.00	N.R.	20.00	23.00	26.00	N.R.	N.R.	N.R.	22.00
	1966	22.00	N.A.	23.00	22.00	23.00	N.A.	N.A.	N.A.	N.A.	N.A.	55.00	50.00
	1967	N.R.	40.00	25.00	22.50	23.20	45.00	40.00	35.00	30.70	32.50	35.00	35.00

Commodity/Market		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tomatoes													
Madras	1965	35.00	55.00	55.00	50.00	65.00	65.00	65.00	46.00	45.00	82.00	110.00	71.00
	1966	80.00	36.00	44.00	54.00	50.00	125.00	50.00	85.00	55.00	90.00	150.00	95.00
	1967	90.00	100.00	50.00	50.00	90.00	90.00	75.00	50.50	50.00	90.00	95.00	58.00
Calcutta	1965	37.52	33.44	37.52	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	70.00
	1966	35.00	15.00	30.00	75.00	87.00	160.00	90.00	80.00	100.00	95.00	80.00	50.00
	1967	20.00	20.00	40.00	70.00	95.00	135.00	100.00	140.00	120.00	150.00	130.00	60.00
Kanpur	1965	29.48	32.16	42.87	40.20	64.32	80.38	N.A.	107.20	100.00	90.29	75.04	56.28
	1966	32.16	29.00	67.27	60.00	60.00	N.A.	N.A.	N.A.	N.A.	98.00	45.55	56.26
	1967	N.R.	70.00	52.00	83.71	72.50	105.00	117.42	150.00	115.00	95.00	80.00	35.00
Cauliflowers													
Madras(Per Doz.)	1965	1.50	2.50	4.00	5.50	6.50	7.20	7.20	N.A.	N.A.	N.A.	6.00	N.A.
	1966 (per 100)	40.00	40.00	40.00	40.00	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	30.00
	1967 (per 100)	30.00	50.00	60.00	120.00	150.00	160.00	150.00	150.00	200.00	300.00	100.00	50.00
Kanpur(Per 100)	1965	8.00	6.00	9.50	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	10.00	17.00
	1966	8.00	24.00	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	22.00	14.50	20.00
	1967	N.R.	44.00	45.00	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	45.00	N.A.	13.00
Peas													
Madras	1965	100.00	115.00	170.00	220.00	225.00	235.00	239.00	115.00	275.00	260.00	287.00	125.00
	1966	150.00	150.00	250.00	200.00	250.00	400.00	200.00	300.00	350.00	300.00	300.00	125.00
	1967	100.00	150.00	250.00	250.00	300.00	N.A.	300.00	150.00	300.00	300.00	250.00	150.00

Commodity/Market		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Kanpur	1965	58.96	40.20	42.88	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N .A.	N .A.	N.A.
	1966	75.00	38.00	53.00	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	NA.	N.A.
	1967	N.R.	104.00	52.00	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	80.00
6. Okras													
Madras	1965	55.00	45.00	44.00	44.00	40.00	42.00	42.00	38.00	48.00	50.00	52.00	90.00
	1966	100.00	54.00	46.00	42.00	40.00	58.00	40.00	25.00	35.00	50.00	100.00	120.00
	1967	90.00	70.00	50.00	50.00	50.00	70.00	70.00	50.00	50.00	50.00	68.00	70.00
Kanpur	1965	N.A.	N.A.	96.45	56.28	29.48	50.91	53.60	46.36	48.24	42.88	45.56	N.A.
	1966	N.A.	N.A.	N.A.	85.00	50.00	45.00	50.00	50.00	40.00	60.00	N.A.	N.A.
	1967	N.R.	N.A.	N.A.	80.00	40.60	48.00	60.30	85.00	70.00	85.00	N.A.	N.A.

NOTES: * Primary Markets.
NS. No supply; N.T. No Transaction; N.R. Not Reported;
N.A. Not available

Source: Bulletin of Agricultural Prices, Directorate of Economics and Statistics, Ministry of Food & Agriculture.

PART B

PROCESSED FRUITS AND VEGETABLES

GENERAL

REVIEW OF PROCESSING INDUSTRY IN INDIA

Background

The preserved fruit and vegetable industry of India can be traced back to times immemorial when items like pickles, chutneys, syrups and dried vegetables were manufactured indigenously through the salting, pickling and sun-drying methods both for individual and commercial use. The canning of fruits and vegetables by relatively modern techniques was, however, started rather recently and the first modern factory is reported to have been established in late twenties in Bombay. The difficulties encountered in the imports of these items, resulting from the First World War paved the way for the development of this industry in India. The outbreak of war necessitated the indigenous supply of large quantities of canned fruits for the Defence Services, which gave a momentum to the industry.

A further fillip was given to the industry in the thirties by the pioneering technological work initiated by Indian Council of Agricultural Research at Lyallpur and Quetta (now in Pakistan), which led to the setting up of a number of small units, mainly specialising in the manufacture of fruit beverages, in Punjab. The outbreak of Second World War bringing in its offing shipping and other problems rendering the imports of canned fruit items more difficult, proved a boom for the

industry and a few large scale units sprang up in places like Bombay, Delhi and Calcutta where there was easy availability of raw materials required by the industry.

Planned development of the processing industry in India can be said to have commenced with the enactment of Fruit Products Order, 1955. The industry has been receiving concerted attention from the Government, as reflected in the constitution of various expert bodies for dealing with the problems of the industry, including the Development Council and the Fruit Advisory Committee. The Tariff Commission has been holding periodic enquiries to examine the cost structure of the industry and advise the Government on the extent of protection and assistance to be accorded to the industry. Further, in recognition of the potential offered by the industry for exports, the Government set up the Processed Foods Export Promotion Council in 1963. As a result of efforts made by the Government and the industry, there has been considerable progress during the past few years. Total output* of the industry went up from 17,200 tonnes valued at Rs 6.7 million in 1956 to 46,000 tonnes worth Rs 11.6 million in 1967. Exports of the industry increased from Rs 5.0 million in 1961-62 to Rs 18.0 million in 1967-68.

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*Excluding aerated fruit beverages and synthetic syrups which contain little or no fruit juice.

Structure of the Industry

A significant characteristic of the industry is the presence of a large number of cottage scale units dispersed throughout the country. Of the 946 licensed units in 1966, as many as 730 had output below Rs 50,000 a year (cottage scale), 83 units between Rs 50,000 and Rs 100,000 (small scale) and 133 units over Rs 100,000 (large scale). In the last category only 30 units had a turn-over of Rs 1 million or more. If units engaged in the manufacture of synthetic products are excluded, there are only 20 units with a turnover of at least Rs 1 million. which together accounted for over 45% of the total output of the industry (excluding synthetic products) in 1966. But it may be mentioned that 90% of the output of the industry (excluding synthetic products) in 1966. But it may be mentioned that 90% of the output (excluding synthetic products) is accounted for by the large scale units, the small and cottage scale units having a share of 5% each. Break-up of output originating in these three groups by major product groups and by States is shown at Annexures B-8 and B-9.

Classification of Units by Range of Output*

Quantity Basis			Value Basis		
Range in Tonnes	No. of Units	Commulative Total	Range in Rs '000	No. of Units	Commulative Total
Nil	73		Nil	74	
Below 1	138	201	Below 10	413	487
1 - 10	389	600	11 - 50	243	730
11 - 50	201	801	51 - 100	83	813
51 - 100	51	852	101 - 500	88	901
101 - 250	45	897	501 - 1,000	15	916
251 - 500	21	918	1,001 - 1,500	7	923
501 -1,000	14	932	1,501 - 2,000	4	927
above 1,000	14	946	above 2,000	19	946

*Including synthetic products

As between States, Maharashtra accounts for the largest share of production, closely followed by Uttar Pradesh; Mysore, West Bengal and Delhi are other areas of importance. This will be clear from the following table (see Annexure B-6 for detailed State-wise break-up of output).

Areawise Distribution of Units together with Output

(1966)

State/Union Territory	No. of Units*	Total Output		Output excluding synthetic Products	
		Quantity (Tonnes)	Value (Rs'000)	(Q:Tonnes)	(V:Rs'000)
1	2	3	4	5	6
Delhi	62	27,913	37,216	4,463	8,608
Kerala	53	2,728	5,425	2,483	4,736
Madras	143	2,626	4,658	1,112	2,582
Maharashtra	202	26,080	47,085	11,090	29,026
Mysore	35	4,846	13,378	4,463	13,282
Punjab	112	3,621	5,745	3,261	5,197
Uttar Pradesh	125	12,140	33,047	9,243	27,470
West Bengal	68	9,073	16,476	4,461	9,271
Others	146	12,116	9,685	1,426	2,734
Total	946	95,143	1,72,715	42,002	1,04,006

* Some of the units produce exclusively synthetic products; but as separate statistics are not available, numbers shown here correspond to total output and not to output excluding synthetic products.

Another interesting feature is the concentration of the industry in urban areas which represent the major consuming centres. The three metropolitan cities, Bombay, Delhi and Calcutta, alone account for about 40% of the total output, as may be seen from the following table:

Production in Metropolitan Cities

(Tonnes)

	1962	1964	1966
Bombay	4,368	8,876	7,814
Delhi	3,654	4,510	4,463
Calcutta	3,197	3,496	4,375
(a)Total for the three cities	11,219	16,882	16,652
(b)All-India Total	32,657	38,311	42,002
(a)as % of (b)	34.4	44.1	39.6

Other urban centres include Bangalore, Allahabad, Ghaziabad, Mathura, Trichur, Nagpur, Madras and Hyderabad.

Jammu and Kashmir: This State, which is not covered by Fruit Products Order, has 6 canneries in Srinagar and one each in Soupur and Jammu. In addition, there are about 10 cottage units, mainly producing pickles, murabbas, syrups etc.

Units in Jammu and Kashmir specialise in the canning of temperate fruits such as peaches, pears, cherries, plums and apricots and vegetables like asparagus, mushrooms, peas and beans. The volume of production in the State is not significant, total output having been around Rs 2.5 million in 1966.

Investment

Precise data on investment made in the industry are not available. The Directorate of Marketing and Inspection places total investment in the industry at Rs 60 million. During the course of the Commodity Study in India, data relating to capital structure was collected from 32 units accounting for a total output of Rs 50.6 million during 1966, a brief analysis of which is attempted below.

Relating the working and fixed capital figures to the corresponding output figures, it is possible to arrive at certain conclusions. The fixed capital of the 32 units accounting for Rs 50.6 million worth of output amounted to Rs 16.0 million, giving a ratio of 3.2 for output/fixed capital. The corresponding ratio with working capital i.e. output/working capital works out to 2.9 for these 32 units. It is clear that whereas output/fixed capital can be taken as a measure of productivity of capital, the other ratio output/working capital can be used to gauge the efficiency of

operations. Against this background, classification of the 32 survey units by range of annual output shows some interesting results, which are summarised in the following table:

Range of Output	No. of Units	Total Output	Total Fixed Capital	Total Working Capital	Output/ Fixed Capital	Output/ Working Capital
Upto Rs 500,000	16	3,865	2,730	1,375	1.5	2.8
Rs 500,000 to Rs 1 million	6	4,170	1,675	1,125	2.5	3.6
Rs 1 million to Rs 5 million	8	19,235	9,080	8,262	2.1	2.3
Rs 5 million and above	2	23,300	2,530	6,643	9.2	6.4
Total	32	50,570	16,015	17,405	3.2	2.9

It will be seen that productivity of capital increases almost steadily with rising output, being maximum in the top bracket Rs 5 million and above. The same conclusion is true of the efficiency of operations as well, though the variation between different groups of units is not as marked. The only exception in both cases appears to be the group Rs 1 to 5 million, in respect of which the productivity of capital as well as efficiency of operations appear to be somewhat less than the previous bracket Rs 500,000 to Rs 1 million. This, however, does not vitiate the general inference that units with larger

output show a higher utilization of capital as well as efficiency of operations.

Production

Production of processed fruits and vegetables has been rising steadily over the past few years. Total output of the industry went up from 11,929 tonnes in 1952 to 105,640 tonnes in 1967. Excluding synthetic products, the rise in output was from 9,480 tonnes to 47,180 tonnes over this period. The following table reflects the progress of the industry over the past few years:

Output of Processed Fruits and Vegetables*

Year	No. of Units	Total Output		Output excluding Synthetic Products	
		Quantity (Tonnes)	Value (Rs'000)	Quantity (Tonnes)	Value (Rs '000)
1	2	3	4	5	6
1952	572	11,929	17,114	9,480	15,444
1956	750	23,517	25,634	17,232	18,934
1961	901	46,762	65,602	28,569	46,028
1962	929	52,079	78,270	32,657	57,957
1963	699	62,120	93,055	34,856	66,094
1964	909	72,536	111,783	38,237	77,626
1965	947	90,210	147,147	45,143	100,160
1966	946	95,143	172,715	42,002	100,006
1967+	946	105,640	191,940	47,180	116,320

*Directorate of Marketing and Inspection, Nagpur

+Estimates

Composition of Production

The industry, which was originally oriented towards pickles and chutneys, has in recent years come to its own with range of production extending to relatively sophisticated items like jellies, juices, jams and canned temperate fruits as well as various types of vegetables including peas, tinda, parwal, karela and potatoes. A distinct shift in the pattern of production is discernible in favour of jams, jellies, juices and canned fruits and vegetables at the expense of pickles and chutneys. This reflects the faster growth in the non-traditional items as compared to the traditional items. The following table brings out clearly the change taking place in the composition of output in terms of major categories of products:

Composition of Output of Processed Fruits & Vegetables*

	Quantity			Value		
	1956 %	1961 %	1966 %	1956 %	1961 %	1966 %
Canned Fruits and Vegetables	17	21	23	25	28	22
Jams, Jellies and Juices	8	16	21	17	21	24
Pickles and Chutneys	48	23	17	18	17	11
Fruit Beverages	14	19	22	24	18	22
Others	13	21	17	16	16	21
	100	100	100	100	100	100

*Excluding Synthetic Products

While output of jams, jellies and juices became six-fold and that of canned fruits and vegetables two-fold, over the decade 1956-66, production of pickles and chutneys declined by 15% (in terms of quantity) over this period. The detailed statistics on the composition of production appearing at Annexure B-6 would further indicate that the production of canned vegetables rose significantly from 1,955 tonnes in 1956 to 10,325 tonnes in 1965, although there was a marked decline in the following year to 5,895 tonnes. This is directly attributable to fluctuations in Defence demand which accounts for the bulk of output in this category. Tomato products represent another major item which evinced an impressive rise from 350 tonnes in 1956 to 2,080 tonnes in 1966. During the recent past, new products have been successfully introduced such as sweet lime and banana juice cocktails, mango flakes, apricot nectar, lychee wholes, guava in syrup, dehydrated and frozen vegetables. Special mention needs to be made of dehydrated vegetables and soup powders introduced in 1962, production of which went up from 41 tonnes to 461 tonnes during 1966.

Considerable progress has been made in the canning of temperate fruits in the country, particularly in Jammu and Kashmir where these fruits are available in abundance.

Pears, peaches and cherries in syrup, jams and cocktails constitute the major items of production in the temperate fruit sector. In view of the short season of these fruits, canning represents a convenient means of preserving the fruits. Moreover, these fruits being grown in hilly areas which are noted for lack of communication facilities, the canning in the neighbouring city of Srinagar makes it possible for ensuring supply of these items to markets in the plains throughout the year. During the year 1966, the production of canned fruit items in Jammu & Kashmir amounted to Rs 2.0 million

Exports

Exports of processed fruits & vegetables have been showing an upward trend during the past few years, as can be seen from the following table:

Q: Quantity in tonnes
V: Value in Rs '000

Year	Pickles & Chutneys		Other products		Total Exports	
	Q	V	Q	V	Q	V
1961-61	1,701	3,470	808	1,540	2,509	5,010
1962-63	1,998	4,026	1,037	2,333	3,035	6,359
1963-64	1,948	4,014	1,299	3,147	3,247	7,161
1964-65	2,011	4,347	2,571	5,731	4,582	10,078
1965-66	1,890	3,858	2,895	7,079	4,785	10,937
1966-67	1,954	5,444	2,889	9,816	4,843	15,260
1967-68	1,757	5,545	4,432	12,829	6,189	18,374

Pickles and chutneys, which represent traditional items, figure prominently in India's exports of processed fruits & vegetables. While these are made mostly from mango, small quantities of lime and banana pickles are also exported. Canned fruits, fruit juices, squashes and, lately, vegetable products(mushrooms) are growing in importance. Among items successfully introduced in the overseas markets during the last few years, mention may be made of mango nectar, canned mango slices, mandarin orange segments, and pineapple juice. The sudden spurt in exports in 1964-65, which was kept up in the subsequent years(even after allowing for the 36.5% devaluation of the Indian rupee in June 1966), was due largely to substantial orders from USSR for fruit juices (particularly, mango juice), and a phenomenal rise in the exports of canned mushrooms and Brussels sprouts. While exports of pickles & chutneys remained stagnant around Rs 4 million, exports of other products registered a remarkable rise from Rs 1.5 million in 1961-62 to Rs 12.8 million during 1967-68. Consequently, the share of pickles & chutneys in total exports declined from 69% in 1961-62 to 30% by 1966-67. Detailed statistics of exports are provided at Annexure B-16.

The United Kingdom is the traditional market for most Indian processed fruit & vegetable products, especially for pickles & chutneys and canned fruits & vegetables. The share of UK in total exports, however, declined from 38% to

23% during the past seven years, mainly as a result of rising exports to USSR which has recently emerged as an important buyer of Indian fruit juices. Starting from virtually nil till 1962-63, the share of USSR in total exports progressively increased to 27% by 1967-68; exports to USSR comprise mainly mango nectar. The steep rise in the exports of canned mushrooms and Brussels sprouts is reflected in the share of Switzerland in total exports going up from 3% to 13% between 1961-62 and 1966-67; the share however declined to 6% during the following year. With increased offtake of mango nectar, Kuwait has emerged as the third largest importer of Indian processed fruits and vegetables, its share in total exports having steadily risen from 2% in 1961-62 to 16% in 1967-68. On the other hand, the share of Iraq, which used to be a major market for Indian pickles and chutneys, went down from 11% to as low as 1% over the same period, as a result of rigid import restrictions in that country in recent years. While the break-up of exports by major destinations is shown at Annexure B-17, the following table indicates the direction of India's exports during the past six years:

(Next Page)

Percentage share of total exports (value)

Destination	1961-62	1965-66	1966-67	1967-68
UK	38	27	28	23
USA	11	6	6	5
Iraq	11	6	2	1
Switzerland	3	13	13	6
Kuwait	2	4	9	16
Saudi Arabia	2	4	1	3
France	2	2	4	4
USSR	-	23	24	27
Other countries	31	15	13	15
Total	100	100	100	100

Scope for Increased Exports

India's exports of processed fruits & vegetables, at about 5,000 tonnes a year, represent scarcely 1% of the world trade in this respect. This reveals the immense scope that exists for expansion of Indian exports in this field. That about 20 million tonnes of fresh fruits and vegetables of numerous varieties are grown in the country provides an indication of the sound resource-base available for development of the processing industry as a source of increased foreign exchange earnings to the country, and a positive export bias is sought to be brought about in the development of the industry.

PATTERN OF PRODUCTION

Official statistics on production of the industry do not generally show classification by fruit/vegetable base, although break-up by major product groups is available. An attempt has therefore been made in the Commodity Study to study the pattern of production from this angle. Since completion of the Commodity Study, however, the Directorate of Marketing & Inspection (DM&I) has come out with a publication* wherein statistics on the production of the four major categories--mango products, pineapple products, orange products and tomato products--are provided, together with Statewise break-up (see Annexure B-7). While the Directorate confines itself to identifying these four categories, the statistics provided pertain to the industry as a whole. On the other hand, more categories of the type indicated above could be identified on the basis of data collected from 61 units in the Commodity Study, which together accounted for 22,294 tonnes of production against the total output of the industry, 42,002 tonnes in 1965, thus ensuring a coverage of 53%. Putting these two sets of data together, certain conclusions are possible, which are discussed below.

Data provided by DM&I on Statewise production of the four major categories lead to the following analysis:

(Next page)

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* Fruit and Vegetable Preservation Industry in India - Statistics of Production and Exports, 1966, Directorate of Marketing & Inspection, Nagpur (January 1966)

Statewise Pattern of Production*

(Percentages)

	Delhi	Kerala	Mahara-shtra	Mysore	Punjab	Uttar Pradesh	West Bengal	Other States	All India
Mango Products	15	7	47	23	18	15	39	15	27
Pineapple Products	Negl	78	2	7	5	5	3	17	8
Orange Products	1	2	12	25	Negl	2	16	5	9
Tomato Products	8	Negl	5	7	2	7	2	2	5
Other Products	76	13	34	38	75	71	40	61	51
Total	100	100	100	100	100	100	100	100	100

* On the basis of quantum of output in 1966.

It will be seen that mango products is the most important category accounting for as much as 27% of the total output, and that the four categories together account for 49% of the industry's total production. Before attempting further analysis, it is well to have an indication of the composition of 'other products' on the basis of data collected during the Commodity Study. It has been estimated that of the 51% represented by this category, about 6% can be attributed to citrus products other than orange (lime, lemon and grapefruit). As regards the products constituting the balance 45%, it has been possible to arrive at the following break-up on the basis of the Commodity Study data:

(See next page)

Composition of 'Other Products'

(Percentages)

	Delhi	Kerala	Mahara-shtra	Mysore	Punjab	Uttar Pradesh	West Bengal	All India
Guava Products	-	Negl	17	6	2	2	13	5
Apricot Products	Negl	-	2	19	9	2	-	3
Strawberry Products	-	-	1	-	2	2	-	2
Other Fruit Products	67	10	16	64	71	8	11	20
Potatoes	-	34	21	-	-	26	3	19
Peas	27	-	11	-	16	23	44	21
Tinda	-	-	13	-	-	12	5	9
Karela	-	-	1	-	-	7	16	5
Other Vegetable Products	6	56	18	11	-	18	8	16
Total	100	100	100	100	100	100	100	100

Regional Pattern of Production

The pattern of production, as revealed in the above two tables, no doubt reflects to some extent the pattern of horticultural production in the different States. For instance, the predominant position occupied by pineapple products in the processing industry in Kerala is entirely in line with the concentration of fresh pine-apple production in the State. It may be stated in fact that the development of pineries in Kerala has received strong impetus from processing units in the State. Similarly, the concentration of production in Maharashtra in the mango and orange products is in consonance with the important position the State occupies in the country in respect of these crops. While the Ratnagiri belt is well-known for the reputed Alphonso variety of mango which is specially preferred for canning, the Vidarbha region abounds in mandarin oranges.

However, although Uttar Pradesh is the largest mango producing State in the country, mango products account only for 15% of the total production of processed items in the State and 12% of the total production of mango products in the country (see next page). This is in spite of the fact that the varieties grown in the State, such as Dussehri and Langra are as good for processing as other varieties available elsewhere in the country. The processing units in the State concentrate more on vegetable products like canned potatoes, peas, tinda and karela. As may be seen from the above table, these four items account for 68% of other products or about 45% of the total production in the State. These vegetables are no doubt available in abundance in the State, but the major factor influencing the pattern of production would seem to be the nature of demand. Some of the large units located in the State cater primarily to demand emanating from the Defence sector, which relates largely to vegetable products.

The following analysis showing shares of different States in the total production of certain categories is instructive:

(See next page)

Shares of different States in Selected Products*

(Percentages)

	Delhi	Kerala	Mahara-shtra	Mysore	Punjab	Uttar Pradesh	West Bengal	Other States	All India
Mango Products	6	2	46	9	5	12	15	5	100
Pineapple Products	1	56	5	9	4	12	3	10	100
Orange Products	2	1	38	31	Negl	6	19	3	100
Tomato Products	17	Negl	27	16	4	30	4	2	100
Guava Products	Negl	Negl	47	5	Negl	28	19	1	100
Apricot Products	Negl	Negl	11	31	5	53	-	-	100
Strawberry Products	-	-	12	-	2	86	-	-	100
Other Fruit Products	39	2	11	13	5	21	4	5	100
Potatoes	-	7	15	-	-	77	1	-	100
Peas	15	-	7	-	1	62	14	1	100
Tinda	-	-	19	-	-	77	4	-	100
Karela	-	-	4	-	-	75	21	-	100
Other Vegetable Products	4	14	14	3	-	60	4	1	100
Total	11	6	26	11	8	22	11	5	100

* Based on data for the industry as a whole in respect of mango, pineapple, orange and tomato products, and on data collected from 61 selected units in the Commodity Study in respect of other products. Shares have been worked out on the basis of quantum of production.

It is interesting to note that while Uttar Pradesh is the major area of guava production, 47% of the guava products comes from Maharashtra, the share of Uttar Pradesh in the processed output being limited to 28%. The major share vegetables claim in the production of Uttar Pradesh is reflected in the above table which shows that roughly 70% of the total production of potatoes, peas, tinda and Karela is accounted for by Uttar Pradesh alone.

Composition of Production

Although current official statistics show break-up or total output in terms of major product groups such as juices and jams (see Annexure B-5), similar break-up is not available for products based on particular fruits or vegetables. The Survey data have therefore been analysed to obtain an idea of the composition of production within a given category. While details are given at Annexure B-12, the pattern emerging in respect of mango, pineapple, orange and lime products is shown below:

Mango Products*

	Quantity (Tonnes)	%
Slices	1,497	45
Pulp	828	25
Juice	355	11
Nectar	348	11
Squash	142	4
Jam	133	4
Total	3,303	100

*Excluding pickles and chutneys.

Pineapple Products

	Quantity (Tonnes)	%
Slices	1,310	44
Titbits	78	2
Pulp	51	2
Juice	1,142	38
Jam	430	14
Total	3,011	100

Orange Products

	Quantity (Tonnes)	%
Pulp	45	3
Juice	266	17
Squash	670	43
Syrup	388	24
Marmalade	166	11
Jelly	36	2
Total	1,571	100

Lime Products

	Quantity (Tonnes)	%
Juice	317	28
Squash	793	72
Total	1,110	100

Guava Products

	Quantity (Tonnes)	%
Slices	297	57
Juice	15	3
Nectar	35	7
Jam	8	2
Jelly	162	31
Total	517	100

Tomato Products

	Quantity (Tonnes)	%
Puree	240	12
Juice	504	26
Soup	105	5
Sauce & ketchup	1,102	57
Total	1,951	100

It will be seen from the above tables that slices and pulp account for 45% and 25% respectively of mango products excluding pickles and chutneys; juice and nectar come next in importance, together claiming a share of 22%. In the case of pineapple products, slices and juice account for 44% and 38% of the total output, the share of jam being 14%. While squash represents 43% of orange products, syrup and juice together account for 41% of the total production; the share of marmalade is 11%. Squash claims a share of as much as 72% in lime products, the balance being represented by juice. In the case of guava products, slices are the most important accounting for 57% of the total production, followed by jelly (31%) and juice & nectar (10%). Similarly, processing of tomato products is

oriented towards sauce and ketchup which account for 57% of the total production, juice and puree accounting for 26% and 12% respectively of the total.

Pattern of Packaging - Productwise

In view of the fact that available information on the pattern of packaging is scanty, it is proposed to study this aspect in respect of major product groups on the basis of the Survey data (See Annexure B-12, for details).

Mango Products: It has been found that A2½ is the most popular size for mango slices accounting for as much as 93% of the total quantity packed, the share of the 1-lb can being only 6%. In the case of mango pulp, the 5-lb. 'Dalda' can appears to be relatively more popular accounting for 53% of the total quantity packed, with A2½ claiming a share of 40%. Mango juice is packed in bottles as well as cans. While the share of all bottles amounts to 38% in the total quantity packed, A2½ is the most popular size among cans accounting for 36% of the total quantity packed, followed by 5½ oz can which claims a share of 23%. In respect of mango nectar, the shares of A2½ and 5½ oz have been estimated at 77% and 14% respectively.

Pineapple Products: A2½ is by far the most popular pack size for pineapple slices accounting for 79% of the total quality packed, the share of No. 1 Tall being 8%. In respect of juice also A2½ is the most popular size accounting for 59% of the total quantity packed; 1-lb and 5½ oz represent 17% and 8% respectively of the total. In respect of pineapple jam, however, the share of A2½ is limited to 12%; 1-lb bottle claims the largest share of 58%, the shares of 1-lb can 5-lb 'Dalda' can being 13% and 12% respectively.

Orange Products: The popular sizes in packing orange juice are A2½, 5-lb and No. 1 Tall which account for 53%, 27% and 12% respectively of the total quantity packed. Orange squash is packed almost exclusively in the standard 24-oz bottle. In the case of orange marmalade the 1-lb jar and the 1-lb can are the most popular together accounting for 74% of the total production.

Lime Products: Lime juice is also packed mostly in the 24-oz bottle which accounts for 86% of the total quantity packed, the balance being spread over packs of various sizes. The share of the 24-oz bottle in lime squash has been estimated at 71%, other sizes accounting for the balance 29%.

Guava Products: Guava slices are packed mostly in A2½ can which accounts for 93% of the total, the share of No. 1 Tall being 4%. As regards guava juice, 5½-oz can is the most popular pack accounting for 40% of the total production, with A2½ and No. 1 Tall claiming share of 27% each. On the other hand, guava nectar is packed mostly in the A2 can which accounts for 66% of the total production, the balance being represented by 5½-oz can. Guava jelly is packed more in bottles and jars, 1-lb being the popular size among cans accounting for 25% of the total output.

Tomato Products: Tomato puree is packed mostly in A2½ can which accounts for 74% of the total production, the shares of 5-lb can and No. 1 Tall can being 15% and 9% respectively. A2½ is the most popular pack in respect of tomato juice also, representing 70% of the total quantity packed; the share of No. 1 Tall can is 13%. Tomato sauce and ketchup are packed almost exclusively in bottles.

The above analysis may be summarised as follows:

Mango Products

Pack Size	Share in Quantity Packed (%)			
	Slices	Pulp	Juice	Nectar
A2½ can	93	46	36	77
1-lb/No. 1 Tall can	6	1	4	-
5½-oz can	-	-	20	14
5-lb 'Dalda' can	-	53	-	-
Others	1	-	40	9
Total	100	100	100	100

Pineapple Products

Pack Size	Share in Quantity Packed (%)		
	Slices	Juice	Jam
A2½ can	79	59	10
A-1 lb/No. 1 Tall can	8	17	13
5½-oz can	-	8	-
5-lb 'Dalda' can	-	6	12
1-lb bottle/jar	-	-	58
Others	13	10	7
Total	100	100	100

Orange Products

Pack Size	Share in Quantity Packed (%)		
	Juice	Squash	Marmalades
A2½ can	53	-	11
1-lb/No. 1 Tall can	12	-	28
5½-oz can	4	-	-
5-lb can	27	-	-
1-lb bottle/jar	-	-	36
24-oz bottle	-	94	-
Others	4	6	25
Total	100	100	100

Lime Products

Pack Size	Share in Quantity Packed (%)	
	Juice	Squash
24-oz bottle	86	71
Others	14	29
Total	100	100

Guava Products

Pack Size	Share in Quantity Packed (%)			
	Slices	Juice	Nectar	Jelly
A2½ can	93	27	-	7
A 2 can	-	-	66	-
1-lb/No. 1 Tall can	4	27	-	25
5½-oz can	-	40	34	-
1-lb jar	-	-	-	12
Others	3	6	-	56
Total	100	100	100	100

Tomato Products

Pack Size	Share in Quantity Packed (%)		
	Puree	Juice	Sauce & ketchup
A2½ can	74	70	2
1-lb/No. 1 Tall can	9	13	3
5½-oz can	-	2	-
5-lb can	15	-	-
Bottles	2	15	95
Total	100	100	100

Pattern of Packaging - Packwise

It is of interest to analyse the survey data from another angle — the relative importance of different sizes of packs in the total quantity packed. Data classified packwise, with break-up by products, appear at Annexure B-13, which may be summarised as follows:

Pack	Quantity Packed (Tonnes)
A2½ can	11,653
1-lb/No. 1 Tall can	2,177
5½-oz can	253
5-lb can	710
1-lb bottle/jar	749
24-oz bottle	1,580
Other bottles	3,524
Other packs	1,648
	22,294

It should be mentioned that 'other packs' comprise mainly bulk packs such as wooden barrels and 18-litre tins. There is reason to believe that the coverage in the Commodity Study in respect of these packs was not as high in respect of the remaining packs. It would therefore be appropriate to omit

'other packs' while assessing the relative importance of different packs, so as to ensure a higher degree of accuracy in generalizing the results to the industry as a whole. The relative shares of the remaining packs would work out as follows:

Pack	Share in Total* (%)
A2½ can	56
1-lb/No. 1 Tall can	11
5-oz can	1
5-lb can	3
1-lb bottle/jar	4
24-oz bottle	8
Other bottles	17
	100

It will be seen that A2½ can gets the lion's share in the total quantity packed in non-bulk packs. While 1-lb/No. 1 Tall can accounts for 11% of the total, it is significant that the share of the 5½-oz juice can is as low as 1%. Among bottles, 24-oz bottle appears to be more important than the 1-lb pack, from the volume point of view.

Pack-Product Mix

It is equally interesting to study the relative importance of different products in the total volume packed in container of a given size. While details of

*Excluding 'other packs'

different products going into specific packs are presented at Annexure B-13, the following table shows at a glance the pack - product mix obtaining in the industry, in respect of selected packs, on the basis of data collected in the Commodity Study:

Shares of Different Products in Selected Packs

(Percentages)

	A2½ can	1-lb/ No. 1 Tall can	5½-oz can	5-lb can	1-lb Bottle/ Jar
Mango Products	19	8	52	61	8
Pineapple Products	16	14	34	16	33
Orange Products	5	4	4	16	8
Guava Products	2	3	7	-	3
Apricot Products	Neg	7	-	Neg	8
Strawberry Products	Neg	4	-	1	6
Tomato Products	5	7	3	5	-
Potatoes	18	-	-	-	-
Peas	15	18	-	-	-
Others	20	35	-	-	-
Total	100	100	100	100	100

It will be seen from the above table that mango products, pineapple products, potatoes and peas are the most important products packed in A2½ can, together occounting for 68% of the total quantity packed in this container. Of the different products packed in 1-lb/No. 1 Tall can, peas claim the largest share of 18% followed by pineapple products with 14%, the balance being spread over a large number of other products. Mango and pineapple products (juice and nectar) account for 52% and 34% of the total quantity packed in 5½-oz can, the share of guava being 7%. As regards the 5-lb can, which is used mainly for pulps, mango, is by far the most important, claiming a share of 61%, followed by pineapple and orange with a share of 16% each. In the case of the 1-lb bottle/jar, which is used mainly for jams and jellies, pineapple accounts for 33% of the total quantity packed, mango, orange and apricot claiming a share of 8% each; the balance is spread over a large number of other products.

PROBLEMS OF PRODUCTION

Before going into various production problems faced by the processing industry, it would be well to state that one major characteristic underlining the various problems relates to the essentially small size of the industry's operations. As mentioned earlier, there are hardly 20 units with output exceeding Rs 1 million. Another factor, which has a similar bearing on the problems of the industry, is the composition of the demand. A sizeable proportion of the demand for the industry's products comes from Defence, through tenders. Apart from the inevitable uncertainty that is part of the tender system, there is criticism in several quarters that Defence business cannot be looked upon as a normal part of business. Exports do not represent as yet a significant outlet for the industry's production, accounting for some 5,000 tonnes out of the total output of 47,000 tonnes. While it may be reasonable to expect that the proportion should go up, it is generally conceded that a strong domestic base is essential to build up exports of a considerable magnitude.

Fresh Fruits and Vegetables

It is well-known that the processing industry in India,. consuming 70,000 tonnes of fresh fruits and vegetables, barely accounts for 0.4% of the total fresh

produce in the country. Consequently, the industry is not in a position to secure suitable types of fresh fruits and vegetables for processing.

Manufacturers depend mainly on local or adjacent markets for supply of fresh fruits and vegetables, and operate through commission agents. Sometimes, however, supplies are procured from far off places. This is particularly true of fruits. For instance, Banganapally mangoes, which are available early in the season about April, move all the way from Andhra to canneries located in distant centres like Calcutta and Allahabad. Similarly pineapples are procured by units in Calcutta and Allahabad directly from Assam rather than the local markets, through their own purchase officers or commission agents. The advantage here is one of lower costs. For the same reason, direct procurement from the hill places is preferred in the case of temperate fruits generally.

Direct contact between growers and processors, wherever feasible, helps ensure availability of suitable varieties of fruits and vegetables to the processors. There are, however, certain practical problems. For one thing, the growers tend to become suspicious and are

given to undue fears of exploitation when approached by the processors. For another, middlemen like the pre-harvest contractor hold such a dominant position in the marketing that direct contact with the growers is next to impossible in many cases. Yet another difficulty in entering into direct agreement with growers relates to uncertainty of demand, a problem especially true of units heavily dependent upon Defence tenders. It must be stated in fairness to the commission agents that they play a very useful role in procuring supplies of fresh fruits and vegetables for the processing units. However, direct rapport between growers and processors should be welcomed as a development in the right direction, in the long term interests of the industry. During the course of the Commodity Study, encouraging evidence could be secured pointing to such development, as borne out by the following instances:

a) Hindustan Lever have almost set up an example for others in their method of procurement of peas for their Ghaziabad factory. Agreement reached with growers in the neighbourhood provides not only for supply of seed material, fertilizers and technical guidance but also an assured price at the end.

b) Canneries in Kerala have a definite agreement with growers for supplies of pineapples. In fact, it is stated that pineapple orchards

first sprang up in the region on the strength of assurance from the canners, although at the current level of production of pineapples, offtake of the processing units does not represent a significant proportion of total production.

c) Corn Products, Bombay, leading manufacturers of squashes, cordials etc. procure their entire requirement of lime juice (amounting to about 20,000 gallons a year) from a single grower in Khandesh. In the case of orange juice, they rely on a contractor in Nagpur who procures the juice from individual growers;

d) Pure Products & Madhu Canning, Bombay have opened a separate factory in Baroda exclusively for tomato products. They have excellent arrangements with local growers who have successfully developed cultivation of a particular variety of tomatoes, "chameli", which is specially suited for processing. The advantage of such an arrangement lies not only in assured supplies but also in reduced raw material costs: the unit is able to secure supplies of tomatoes at Rs 30 per quintal in Baroda as against Rs 60 that would have to be paid in Bombay.

e) Processors in places like Bareilly, Allahabad and Kanpur have been able, through the U.P. Directorate of Fruit Utilization, to establish excellent rapport with growers in Jhalkot for supplies of strawberries.

The above examples serve to show that wherever practicable and advantageous, the industry has been establishing direct contacts with growers for supplies of fresh fruits and vegetables. There is every reason to believe that this pattern will become more and more pronounced, with the steady growth of the industry in the years ahead.

Horticulture Research is needed not only for developing new varieties suitable for processing but also for raising yields, which in the ultimate analysis holds the key for securing reduction in costs. While increasing attention is being paid to this aspect in recent years, much remains to be done in this field yet.

Thus, in the case of tomatoes, for instance, there is need for not only developing cultivation of the blood red (SEOUX) variety which is preferred for processing (certain technical problems have been reported in cultivation of this variety under Indian conditions), but also for stepping up the yield which is very low at present: the average yield per hectare is about 10 tonnes in India as against 25 to 30 tonnes realised in major supplying countries like Spain. Similarly, development of the cylindrical variety of pineapples, like the one evolved by Hawaii, would lead to a substantial rise in the processing yield, thereby contributing to reduced cost of production. To take another instance, Japan owes its present domination of the canned mandarin orange segments business to the seedless variety of oranges it has been able to develop. It is obvious that for India to make any appreciable dent in this line in world-markets, development of a similar seedless variety indigenously is an essential prerequisite.

It is heartening to note that a beginning has been made in this direction in Coorg.

Sugar

Sugar represents a major raw material for bulk of the industry's production. While procurement of sugar at control price has all along been a problem because of the inadequate quota, the situation has become acute recently with the partial decontrol of sugar. Fears were expressed during the course of the Commodity Study that as a consequence of the decontrol, sugar may now have to be procured at Rs 400 a quintal in the open market as against the control rate of Rs 145. This means an appreciable rise in cost of production leading to an upward revision of prices, much to the detriment of the industry. The impact of this in quantitative terms will be studied in the following chapter.

This is not to speak of the quality of the sugar supplied to the processing units. The units have been getting only sulphitation sugar, although it is known that carbonisation sugar is more suitable for the industry's products. And even in this, the grades available to the industry are not above 'C'. It has been reported that the bacterial count (an index of hygiene) in the sugar used

by the industry at present is three to four times more than the limit specified in what is known as "canners sugar". Some of the units contacted have suggested that the processing industry should be treated on par with the pharmaceutical industry and the finest type of sugar should be made available to the industry. Discussions with concerned Government officials, however, have revealed that supply of sugar to the processing industry is made in accordance with the standards stipulated for the purpose by the Indian Standards Institution.

Dextrose

An enquiry has been made during the Survey as to why the Indian processing industry is not using dextrose in the place of sugar, as is reportedly the common practice in most supplying countries. This point has been investigated during the course of the Commodity Study. Most of the units contacted have been quick to point out the large differential that exists between the prices of sugar and dextrose. The price of dextrose was reported to be Rs 11 per kg. at the time of Survey in December 1967 as against Rs 1.45 for sugar (control price). Moreover, dextrose being only 80% as sweet as sugar, it would be necessary to use 25% more of dextrose as compared to sugar to obtain the same

sweetness. While agreeing with the desirable properties of dextrose, in that it lends more uniformity and better retentivity to the product, the processors have stated that even abroad use of dextrose is somewhat limited, being used mainly in combination with sucrose and/or invert sugar.

It might be of interest to note certain facts concerning production of dextrose in the country. There are about 12 million acres at present under maize which alone is suitable for dextrose production. Current production of dextrose in the country is about 15,000 tonnes of which roughly 80% is consumed in the pharmaceutical industry, the balance being absorbed mostly by the biscuits industry.

Some of the units have on the other hand pointed to the possibility of using beet sugar which, according to them, is widely used in countries like USA. Current production of beet in the country is of course negligible, the area under the crop being limited to some 200 acres in Punjab. But it is reported that Punjab and Uttar Pradesh are ideal for cultivation of beet and large quantities of beet can be produced in these regions

without much difficulty. The relative economies of production will need to be worked out. If an alternative source like this could be developed for sucrose, it will have the positive advantage of easing the current pressure on cane sugar while ensuring acceptability of the products in world markets.

Pectin, Citric acid etc.

Pectin, citric acid, colouring materials and essences are important among other raw materials required by the industry. Pectin and citric acid still need to be imported, but the supply position appears to be quite satisfactory at present as adequate Actual User licences are issued for imports of these materials. As a consequence of this in fact, the import entitlements, against which imports of these items is possible, scarcely command any premium in the open market now unlike previously. The quality of indigenous essences and colouring materials has been improving steadily, and no complaints have been reported in this regard.

Cans

There has been a substantial improvement in the supply position of tinplate cans to the industry, which used to be a serious bottleneck till a few years ago.

This is mainly a consequence of devaluation in the wake of which imports of tinplate required for the processing industry were liberalised considerably. It may be mentioned that notwithstanding this improvement, majority of the processing units prefer to keep a stock of about three months' requirements of their cans, which to that extent adds to the volume of working capital required. But the basic problem of high can prices remains, which is considerably affecting the competitive position of the industry in foreign markets.

It has also been reported that the quality of indigenous tinplate produced by Rourkela has been showing appreciable progress and is now suitable for canning most vegetable products. Efforts are being constantly made to improve the quality of Rourkela production, particularly to reduce the phosphorous content from the present level of 0.3% to the acceptable limit of 0.2%. Steps are also being taken to produce tinplate by the electrolytic process.

Bottles

The quality of bottles produced is generally not satisfactory in that they are thick and of not proper finish. Although there are a few manufacturers producing relatively good quality bottles, they insist

on a minimum level of orders (about 100 gross bottles) which is in excess of the normal requirements of most of the units.

Machinery and Equipment

Bulk of the machinery and equipment required by the industry can be fabricated indigenously. However, there are a few items which need to be imported, like the four-head filler seamer, automatic equipment for cleaning and cutting vegetables, automatic labelling machine etc. Possibly these also can be fabricated locally but in view of the fact that demand for these is limited, fabricators are not likely to take much interest in their manufacture. Similarly there is evaporating equipment which only a few processing units may be in a position to afford. Installation of this equipment would make possible concentration of juices during season for re-constitution and preparation of beverages during off-season periods. The present method of storing juices in wooden barrels with sulphur dioxide is considered inadvisable from the quality point of view. Necessary foreign exchange would need to be allowed to enable the processing units to import such machinery which will improve the efficiency of operations considerably.

An instance might be cited here of the progress being made in the manufacture of machinery for the processing industry. It is known that Hawaii has developed a very fast machine 'Ginaka' which is capable of peeling and coring pineapples at the rate of 120-130 fruit per minute. The machine commonly used in India at present is of English make, 'Mather and Platt' whose speed is only 8-10 fruit per minute. While our industry cannot immediately gear up to the speed of machines like 'Ginaka', there is need to step up the present efficiency. It has been learnt during the course of the Commodity Study that Cochin Malleables have developed a machine which is capable of handling the fruit at the rate of 30-40 per minute. The machine is understood to be almost ready but for the vital component, the cylinder, which is said to require a very special type of alloy. Research to determine the optimum composition of this alloy will have to be taken up by the Metallurgical Research Institute to expedite this project.

Utilisation of Waste

It is well-known that processing industry abroad achieves economy in cost to a considerable extent by utilising the waste material accruing in the processing. Sugar syrup and animal feeds from the waste material in pineapple processing may be mentioned as one example.

Against this background, utilisation of waste material by the Indian processing industry is negligible. The only exception appears to be Noga of Nagpur, who recover citrus oil from the peels of oranges. Considering that mango represents an important fruit used in the processing, considerable advantage can be realised by utilisation of mango seeds alone which accrue as a by-product in large quantities in most of the units. In fact most of the units have expressed a keen desire to know-how these seeds can be put to some economic use. It is understood that Central Food Technological Research Institute (CFTRI), Mysore have decided to undertake research on utilisation of mango seeds, i.e. to develop the process of manufacture of animal feeds from this material, to design the machinery required for this purpose etc. This should be expedited in the interests of securing some economy in the present high cost of production. The scheme prepared by CFTRI for production of papain and pectin from papaya is given at Annexure B-14.

PROBLEMS OF EXPORT MARKETING

The problems facing exports of processed fruits and vegetables may be studied under the following heads:

Quality

The quality of mango and pineapple products appears to be quite satisfactory. As regards citrus prospects of entering international business in orange segments would seem to depend heavily on developing seedless variety of oranges, like the one developed by Japan which holds a dominant position in this line at present. The scope for exports of grapefruit juice appears to be bright, but this remains to be exploited; this is not a significant line of production at present. The quality of temperate fruit products appears to be below standard, mainly because pears, peaches etc. available in the country are not upto the mark. Here the basic problem would appear to be one of improving the quality of the raw material through better attention to horticultural development.

Apart from the quality of the contents, there is the question of presentation. Some of the manufacturers contacted are of the opinion that use of lithographed cans would considerably improve the presentation and enhance the prospects of marketing abroad. It is known that suppliers like Japan extensively use lithographed cans

for packing mandarin orange segments and other products, much to their advantage. It is generally agreed that lithographed cans represent a vital factor in the marketing of juices in small packs (6oz), although from the point of view of flexibility, a minimum volume is necessary to use lithographed cans in the place of paper labelled cans. This question assumes importance because heat-resistant inks required for lithographing will need to be imported as they are not produced indigenously yet.

The quality of indigenous labels has improved substantially during the past few years, although good quality labels are fairly costly. No serious complaints have been received about the packaging materials like bottles, caps and closures. However, as mentioned earlier, though it is possible to get good quality bottles at a price not substantially different from that payable to other types of bottles, the manufacturers of such good quality bottles usually require orders to be placed in substantially large numbers, beyond the normal requirements of majority of the manufacturers. This incidentally illustrates how certain advantages cannot be realised because of the small scale of operations.

Prices

It is generally agreed that high cost of production is a major hurdle in the way of increased exports. There are numerous variations in the cost of production

depending on the units and the products. While costs of production of selected products are given at Annexures B-18 to B-29, the following example serves to facilitate proper appreciation of the discussions in the sequel:

Canned Mango Slices - 24x850 gms(A 2½ tins)
(1967)

	Rs
Mangoes	31.50
Sugar	4.38
Citric Acid	0.19
Fuel, electricity etc.	1.13
Labour	4.80
Cans	12.24
Labels	1.00
Outer packaging	4.00
Total Prime Cost	59.24

The above table shows the typical break-up of cost of production of canned mango slices which is an important export item at present. As against the prime cost of production of Rs 59/- a case, the f.o.b. export price is about Rs 75/-. Bulk of the difference, it must be stated, represents overheads, selling as well as manufacturing. It might also be mentioned that as against the export

price of Rs 75/-, selling price in the domestic market would be over Rs 90/- per case. An analysis of the cost data shows that 25 to 30% of the selling price can be attributed to overheads, selling as well as production. It is the common practice to apportion a larger proportion of the overheads to the domestic sales. If overheads are equitably charged on export sales, the margin left for profit would be negligible, if not negative.

On the other hand it can be seen that cans account for 21% of the prime cost of production. This proportion rises to as much as 49% in cases such as guava juice(vide Annexure B-24). Available information shows that can prices in India are twice as costly as abroad, even after taking into account the tinplate drawback allowed on exports of processed fruit and vegetable products. It seems fairly obvious that no appreciable reduction in cost of production can be aimed at without reducing the cost of packaging. Re-introduction of the subsidy on tinplate at the rate of Rs 500/- per tonne in addition to the drawback, which had been in operation till April, 1963 merits serious consideration in this context.

Sugar is another important ingredient in most of the industry's products. It is well-known that the domestic price of sugar, at control rate, is about three times as high as the international price of sugar.

The position in regard to sugar has become acute with the partial decontrol of sugar recently announced. Fears were expressed during the course of the Commodity Study that the units may now have to buy sugar at Rs 400/- a quintal as against Rs 145/- a quintal at control rate. Sugar is of course made available at control price as far as requirements for exports are concerned. But considering that exports do not represent a significant outlet for the industry's production, it is the domestic market on which the industry's prospects continue to depend for quite sometime to come. The difficulty arises because domestic demand is highly elastic at the present level of incomes, and it is not possible to pitch up domestic Prices beyond a certain point.

The impact on export prices can be seen from the fact that the cost component due to sugar ranges upto as much as 40% in certain cases (reckoning sugar price at Rs 145 a quintal). It is next to impossible to mark up export prices any further in competitive world markets where Indian products are already outpriced in several cases. This, coupled with the inherent limitation in passing on the increased cost of production to the domestic market, makes it imperative that Government should make sugar available to the requirements of the domestic market as well, atleast partially. The accent on exports can

still be maintained by stipulating certain ratio between the quantities of sugar made available at control price for the export market and the domestic market.

Export Assistance

Consequent upon devaluation, the draw-back rate on tinplate was enhanced from Rs 409 to Rs 957.67 per tonne so as to compensate for the rise in the import cost of tinplate. However, most of the exporters still continue to get the drawback at the old rate. The reason for this appears to be that the Customs authorities insist on proof that the tinplate used for the cans is imported and not indigenously produced, and they would not accept a certificate to this effect from the can fabricators. This situation certainly calls for corrective measures. Apart from the adequacy of the drawback (this applies to other forms of assistance including cash assistance), there have been persistent complaints from the industry that it takes unduly long time to realise the drawback amount from the Government, which means blocking of resources for so much time. In fact most of the relatively small exporters, who are otherwise in a position to effect exports at the prevailing rates, are reluctant to enter export business only because they are not in a position to undertake all the trouble that is required for realisation of the drawback and other forms of assistance extended by the Government.

In addition to supplying sugar at control price for at least part of the domestic market, if the Government re-introduces the subsidy on tinplate at the rate of Rs 500 per tonne, there is reason to believe that the competitive position of the industry will be considerably improved in world markets.

Inter Se Competition

While on the one hand the industry is facing fierce price competition in world markets, on the other hand there is a fairly high degree of inter se competition among Indian exporters in some of the products. This has been possible because of the lack of grade specifications for the industry's products. While the Fruit Products Order which regulates the working of the industry does specify minimum standards (see Annexure C-2) to be observed, there are no grades as such which are being followed by the industry. The Indian Standards Institution is known to have formulated standards (see Annexure C-3) for many of the products, but these are not being observed by the industry as there is no authority to enforce these specifications. The instance of mango nectar is a case in point. It has been reported that as a result of intense competition among Indian exporters, the prices quoted to foreign buyers for this product have registered a steep decline in recent months. This became possible as different exporters were free to choose different

degrees of concentration (juice content) in the absence of definite grade specifications. While such a step might pay dividends in the immediate run, there is no doubt that the long term interests of the industry and trade are bound to be adversely affected by such practices. The Directorate of Marketing & Inspection is understood to have taken a decision to prescribe a minimum standard of 49% juice content for mango nectar.

Against this background, it seems necessary and advantageous to undertake compulsory pre-shipment inspection enforcing conformity of products to accepted standards so that substandard products may not be exported. It is possible, however, that for administrative reasons, such compulsory inspection may have to wait till the volume of total exports of this industry reaches a sizeable level. On the other hand, it would appear advantageous for exporters to form themselves into a consortium or consortia so that unhealthy competition resulting in unnecessary fall in prices can be prevented. This is a move which has to come entirely from the industry and trade. Discussions held during the course of the Commodity Study have shown that opinion is divided on this issue. While some of the manufacturers and exporters are very keen on the emergence of such consortia (on the lines of those said to be existing in Japan), there are a few who are very sceptical about the possibility of organising such associations.

The Processed Foods Export Promotion Council should take initiative in this matter.

Publicity

Publicity, particularly brand publicity in the European markets, is obviously an expensive proposition. Majority of the exporters are in no position to undertake comprehensive publicity in these markets, apart from the fact that the Reserve Bank has its own restrictions on the amount that can be spent on foreign publicity. The Government does sponsor publicity, generic as well as brand, through the Processed Foods Export Promotion Council. But the amount allowed for this purpose, at about Rs 500,000 a year, is far from adequate. Increased funds will need to be made available to the Council, as effective publicity is a vital factor for success in the marketing of processed fruits and vegetables.

PROCESSED FRUITS AND VEGETABLES PRODUCTION

ANNEXURE B-5

OUTPUT OF PROCESSED FRUITS AND VEGETABLES

Q: Quantity in Tonnes
V: Value in Rs '000

Products	1961		1964		1965		1966		1967*	
	Q	V	Q	V	Q	V	Q	V	Q	V
Canned Fruits	2,409	5,507	3,363	7,885	4,429	11,626	3,740	10,681	4,110	11,750
Canned Vegetables	4,700	7,535	7,971	12,999	10,325	18,735	5,895	11,742	6,480	12,920
Jams, Jellies & Marmalades	2,202	5,233	2,986	8,050	3,260	9,838	3,073	9,806	3,380	10,700
Juices & Pulps	2,374	4,633	4,223	9,228	4,140	10,891	5,581	15,054	6,420	17,310
Preserves	2,912	3,624	3,186	6,112	3,282	6,677	3,998	7,634	4,400	8,400
Crystallised Fruits	59	110	164	367	172	350	170	477	190	520
Chutneys	1,349	2,782	1,098	2,347	1,243	2,914	1,449	4,060	1,740	4,870
Pickles	5,453	8,279	6,391	7,598	5,575	8,666	5,531	7,903	2,290	6,520
Fruit Beverages	1,731	3,449	6,161	15,565	9,798	20,755	9,421	23,234	6,640	9,480
Tomato Products	2,232	5,037	2,237	5,544	2,300	5,631	2,080	5,930	10,360	25,560
Dehydrated Fruits & Vegetables	-	-	110	1,177	209	3,274	464	5,816	510	6,400
Frozen Fruits & Vegetables	-	-	10	21	4	22	3	8	660	4,840
Others	148	289	408	804	406	781	597	1,661		
Total	28,469	46,028	38,311	77,697	45,143	100,160	42,002	104,006	47,180	116,360
Synthetic Products	19,293	19,574	34,299	34,158	45,067	46,987	53,141	68,709	58,460	75,580
Grand Total	47,762	65,602	72,610	111,855	90,210	147,147	95,143	172,715	105,640	191,940

Source: Directorate of Marketing & Inspection, Nagpur.

*Our Estimates

STATEWISE BREAK-UP OF OUTPUT OF PROCESSED FRUITS AND VEGETABLES

Q: Quantity in Tonnes
V: Value in Rs '000

Products	Andhra Pradesh		Assam		Bihar		Delhi		Goa	
	Q	V	Q	V	Q	V	Q	V	Q	V
Canned Fruits	148	376	20	35	1	3	350	1,158	98	262
Canned Vegetables	85	147	Neg.	1	2	8	424	812	1	1
Jams, Jellies & Marmalades	36	79	18	64	Neg.	2	205	610	2	5
Juices & Pulps	9	31	16	36	Neg.	Neg.	67	270	44	83
Preserves	Neg.	Neg.	-	-	9	17	1,499	2,561	-	-
Crystallised fruits	-	-	-	-	-	-	55	163	-	-
Chutneys	Neg.	1	-	-	Neg.	Neg.	13	332	-	-
Pickles	37	48	Neg.	Neg.	-	-	719	686	-	-
Tomato Products	28	74	Neg.	1	2	6	354	924	-	-
Fruit Beverages	277	764	146	372	3	13	658	1,274	-	-
Dehydrated vegetables	-	-	-	-	-	-	-	-	-	-
Frozen fruits & vegetable	-	-	-	-	-	-	-	-	-	-
Others	10	30	-	-	-	-	119	118	-	-
Total	630	1,550	200	509	17	49	4,463	8,608	145	351
Synthetic Products	13	19	-	-	6	27	23,450	28,608	2,036	1,795
Grand Total	643	1,569	200	509	23	76	27,913	37,216	2,181	2,146

Q: Quantity in Tonnes
V: Value in Rs '000

Products	Gujarat		Himachal Pradesh		Kerala		Madhya Pradesh	
	Q	V	Q	V	Q	V	Q	V
Canned fruits	15	54	3	10	992	2,087	-	-
Canned vegetables	-	-	-	-	189	249	1	3
Jams, Jellies & Marmalades	-	-	6	26	140	334	Neg.	Neg.
Juices & Pulps	26	86	26	145	1,008	1,861	-	-
Preserves	3	16	2	5	-	-	1	3
Crystallised fruits	-	-	-	-	-	-	-	-
Chutneys	18	75	-	-	2	4	Neg.	1
Pickles	81	181	Neg.	Neg.	50	155	39	38
Tomato Products	-	-	4	13	2	4	2	7
Fruit Beverages	-	-	14	34	105	242	8	18
Dehydrated Vegetables	-	-	-	-	-	-	-	-
Frozen Fruits & Vegetables	-	-	-	-	-	-	-	-
Others	1	3	2	3	Neg.	Neg.	-	-
Total	144	415	57	236	2,483	4,936	51	70
Synthetic Products	2,478	3,901	1	2	245	489	33	86
Grand Total	2,622	4,316	58	238	2,728	5,425	84	156

Q: Quantity in Tonnes
V: Value in Rs '000

Products	Madras		Maharashtra		Manipur		Mysore		Orissa	
	Q	V	Q	V	Q	V	Q	V	Q	V
Canned Fruits	22	84	589	2,250	1	3	202	689	Neg.	1
Canned Vegetables	5	5	531	1,188	-	-	157	240	-	-
Jams Jellies & Marmalads	84	201	610	2,396	1	4	754	2,885	-	-
Juices & Pulps	56	160	1,861	5,977	Neg.	Neg.	737	2,252	4	11
Preserves	Neg.	1	10	74	-	-	2	9	-	-
Crystalised Fruits	-	-	78	229	-	-	5	18	-	-
Chutneys	3	20	358	1,254	-	-	1	7	-	-
Pickles	255	858	2,655	3,895	Neg.	1	38	179	-	-
Tomato Products	6	27	570	1,876	-	-	331	1,045	-	-
Fruit Beverages	670	1,121	3,615	10,408	8	22	,236	5,358	135	330
Dehydrated Vegetables	7	87	Neg.	2	-	-	-	-	-	-
Frozen Fruits & Vegetables	-	-	-	-	-	-	-	-	-	-
(thers	4	18	213	377	-	-	-	-	-	-
Total	1,112	2,582	11,090	29,926	10	30	4,463	12,382	139	342
Synthetic Products	1,514	2,076	14,990	17,159	-	1	383	996	-	-
Grand Total	2,636	4,658	26,080	47,085	10	31	4,846	13,378	139	342

Source: Directorate of Marketing & Inspection, Nagpur.

Q: Quantity in Tonnes
V: Value in Rs '000

Products	Punjab		Rajasthan		Tripura		Uttar Pradesh		West Bengal		Total	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
Canned Fruits	2	4	-	-	1	2	838	2,511	458	1,152	3,740	10,681
Canned Vegetables	5	4	-	-	-	-	3,378	7,847	1,117	1,237	5,895	11,742
James, Jellies & Marmalads	39	141	-	-	-	-	748	2,133	430	1,226	3,073	9,806
Juices & Pulps	13	70	Neg.	1	-	-	959	2,878	760	1,193	5,581	15,054
Preserves	1,631	3,088	5	11	-	-	836	1,849	-	-	3,998	7,634
Crystalised Fruits	3	8	-	-	-	-	28	56	-	3	170	477
Chutneys	12	23	Neg.	Neg.	-	-	10	32	1,032	2,611	1,449	4,060
Pickles	1,144	842	12	24	-	-	375	540	126	456	5,531	7,903
Tomato Products	74	165	5	9	-	-	624	1,558	78	221	2,080	5,930
Fruit Beverages	315	800	4	16	3	11	831	1,522	393	929	9,421	23,234
Dehydrated Vegetables	Neg.	Neg.	-	-	-	-	455	5,717	2	10	464	5,816
Frozen Fruits & Vegetables	-	-	-	-	-	-	-	-	3	8	3	8
Others	23	52	3	3	-	-	161	827	61	230	597	1,661
Total	3,261	5,197	29	64	4	13	9,243	27,470	4,461	9,276	42,002	104,006
Synthetic Products	360	548	123	225	-	-	2,897	5,577	4,612	7,200	53,141	68,709
Grand Total	3,621	5,745	152	289	4	13	12,140	33,047	9,073	16,476	95,143	172,715

Source: Directorate of Marketing & Inspection, Nagpur.

STATEWISE BREAK-UP OF OUTPUT BY MAJOR PRODUCT GROUPS
(Mango, Pineapple, Orange and Other Products)

Q: Quantity in Tonnes
V: Value in Rs '000

State/Union Territory	Mango Products		Pineapple Products		Orange Products		Tomato Products		Other Products		Total Products	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
Andhra Pradesh	111	215	8	26	30	97	28	74	453	1,138	630	1,550
Assam	-	-	90	257	33	95	Neg.	1	77	156	200	509
Bihar	3	10	Neg.	2	Neg.	1	2	6	12	30	17	49
Delhi	675	1,242	20	73	61	145	354	924	3,353	6,224	4,463	8,608
Goa	6	33	13	36	-	-	-	-	126	282	145	351
Gujarat	61	208	-	-	-	-	-	-	83	207	144	415
Himachal Pradesh	5	14	Neg.	2	-	-	4	13	48	207	57	236
Kerala	183	197	1,930	4,059	48	110	2	4	320	566	2,483	4,936
Madhya Pradesh	33	37	1	2	Neg.	Neg.	2	7	15	24	51	70
Madras	346	759	199	282	26	50	6	27	535	1,464	1,112	2,582
Maharashtra	5,157	15,064	187	645	1,383	6,112	570	1,876	3,793	6,229	11,090	29,926
Manipur	Neg.	1	5	15	Neg.	Neg.	-	-	5	14	10	30
Mysore	1,048	3,248	310	877	1,112	2,677	331	1,045	1,662	4,535	4,463	12,382
Orissa	7	14	23	34	1	10	-	-	108	284	139	342
Punjab	576	437	150	695	7	28	74	165	2,454	3,872	3,261	5,197
Rajasthan	2	5	1	4	1	5	5	9	10	41	29	64
Tripura	-	-	3	11	1	2	-	-	-	-	4	13
Uttar Pradesh	1,350	3,198	425	870	212	571	624	1,558	6,632	21,273	9,243	27,470
W. Bengal	1,754	3,551	112	444	698	580	78	221	1,819	4,480	4,461	9,276
Total	11,317	28,233	3,477	8,334	3,613	10,483	2,080	5,930	21,515	51,026	42,002	104,006

Source: Directorate of Marketing & Inspection, Nagpur.

OUTPUT OF PROCESSED FRUITS AND VEGETABLES BY LARGE, SMALL AND COTTAGE SCALE SECTORS WITH PRODUCTWISE BREAK-UP

Q: Quantity in Tonnes
V: Value in Rs '000

Product	Large Scale		Small Scale		Cottage Scale		Total	
	Q	V	Q	V	Q	V	Q	V
Canned Fruits	3,506	10,049	78	186	156	446	3,740	10,681
Canned Vegetables	5,619	11,323	117	185	159	234	5,895	11,742
Jams, Jellies and Marmalades	2,696	8,803	141	450	236	553	3,073	9,806
Juices and Pulps	5,322	14,411	152	413	107	230	5,581	15,054
Preserves	3,017	6,003	682	927	299	704	3,998	7,634
Crystallised Fruits	62	189	57	145	51	143	170	477
Chutneys	1,390	3,860	43	157	16	43	1,449	4,060
Pickles	3,112	5,253	1,158	1,142	1,261	1,508	5,531	7,903
Tomato Products	1,903	5,542	68	201	109	187	2,080	5,930
Fruit Beverages	8,318	21,096	380	731	723	1,407	9,421	23,234
Dehydrated Fruits and Vegetables	443	5,623	14	167	7	26	464	5,816
Frozen Fruits & Vegetables	-	-	-	-	3	8	3	8
Others	220	1,117	94	217	283	327	597	1,661
Total	35,608	93,269	2,984	4,921	3,410	5,816	42,002	104,006
Synthetic Products	50,828	65,019	759	1,032	1,554	2,658	53,141	68,709
Grand Total	86,436	158,288	3,743	5,953	4,964	8,474	95,143	172,715

Note: The basis of classification of Units into Large, Small and Cottage Scale Categories is as follows:

Large Scale: Value of output (or capacity) Rs 100,000 or more
Small Scale: Value of output (or capacity) Rs 50,000 or more but below Rs 100,000
Cottage Scale: Value of output (or capacity) below Rs 50,000

Source: Directorate of Marketing & Inspection, Nagpur.

OUTPUT OF PROCESSED FRUITS AND VEGETABLES BY LARGE, SMALL AND COTTAGE SCALE SECTORS WITH STATEWISE BREAK-UP*

Q: Quantity in Tonnes
V: Value in Rs '000

State/Territory	Large Scale			Small Scale			Cottage Scale			Total		
	No. of Units	Q	V	No. of Units	Q	V	No. of Units	Q	V	No. of Units	Q	V
Andhra Pradesh	2	540	1,375	1	24	55	20	79	139	23	643	1,569
Assam	1	64	194	3	59	170	11	77	145	15	200	509
Bihar	-	-	-	-	-	-	10	23	76	10	23	76
Delhi	19	26,829	35,543	8	571	666	35	513	1,007	62	27,913	37,216
Goa	3	2,160	2,068	1	21	78	1	Neg.	Neg.	5	2,181	2,146
Gujarat	2	2,155	3,843	4	336	314	33	131	159	39	2,622	4,316
Himachal Pradesh	-	-	-	2	31	137	2	27	101	4	58	238
Kerala	5	2,422	4,722	4	125	268	44	181	435	53	2,728	5,425
Madhya Pradesh	-	-	-	-	-	-	16	84	156	16	84	156
Madras	8	1,451	2,401	9	335	678	126	840	1,579	143	2,626	4,658
Maharashtra	37	23,818	44,172	19	1,274	1,521	146	988	1,392	202	26,080	47,085
Manipur	-	-	-	-	-	-	3	10	31	3	10	31
Mysore	7	4,745	13,160	-	-	-	28	101	218	35	4,846	13,378
Orissa	1	109	283	-	-	-	2	30	59	3	139	342
Punjab	13	2,372	3,840	12	539	938	87	710	967	112	3,621	5,745
Rajasthan	-	-	-	-	-	-	27	152	289	27	152	289
Tripura	-	-	-	-	-	-	-	4	13	1	4	13
Uttar Pradesh	19	11,173	31,523	5	169	359	101	798	1,165	125	12,140	33,047
W. Bengal	15	8,597	15,163	10	259	769	43	217	544	68	9,073	16,476
Total	132	86,435	158,287	78	3,743	5,953	736	4,965	8,475	946	95,143	172,715

*See Footnote to Table B-8.

Source: Directorate of Marketing & Inspection, Nagpur.

ANNEXURE B-10

FREQUENCY DISTRIBUTION OF UNITS ON THE BASIS OF QUANTUM OF PRODUCTION WITH STATEWISE BREAK-UP

State/Union Territory	Nil	Below 1 tonne	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50	51 to 100	101 to 250	251 to 500	501 to 1000	Above 1000	Total
Andhra Pradesh	4	5	8	2	3	-	-	-	-	-	1	-	23
Assam	-	3	5	4	2	-	-	1	-	-	-	-	15
Bihar	-	4	6	-	-	-	-	-	-	-	-	-	10
Delhi	3	3	14	9	6	4	1	5	7	5	3	2	62
Goa	1	-	-	-	1	-	-	2	-	-	-	1	5
Gujarat	4	10	17	1	1	1	2	-	2	-	-	1	39
Himachal Pradesh	-	-	1	2	1	-	-	-	-	-	-	-	4
Kerala	4	11	25	4	3	-	-	1	1	2	2	-	53
Madhya Pradesh	1	5	8	1	1	-	-	-	-	-	-	-	16
Madras	11	14	73	20	9	6	3	2	2	1	2	-	143
Maharashtra	23	21	76	14	16	5	5	16	15	4	3	4	202
Manipur	-	2	1	-	-	-	-	-	-	-	-	-	3
Mysore	3	10	13	2	1	-	-	1	3	1	-	1	35
Orissa	-	-	1	-	1	-	-	-	1	-	-	-	3
Punjab	3	14	52	12	5	4	4	8	6	4	-	-	112
Rajasthan	2	6	16	2	-	-	-	1	-	-	-	-	27
Tripura	-	-	1	-	-	-	-	-	-	-	-	-	1
Uttar Pradesh	10	23	46	10	13	2	1	6	6	3	2	3	126
West Bengal	4	7	26	7	3	5	2	8	2	1	1	2	68
Total	73	138	389	90	66	27	18	51	45	21	14	14	946

Source: Directorate of Marketing & Inspection, Nagpur.

ANNEXURE B-11

FREQUENCY DISTRIBUTION OF UNITS ON THE BASIS OF VALUE OF PRODUCTION WITH STATEWISE BREAK-UP

State/Union Territory	Range of Output in Rupees										
	Nil	Below 10,000	11,000 to 20,000	21,000 to 30,000	31,000 to 40,000	41,000 to 50,000	51,000 to 60,000	61,000 to 70,000	71,000 to 80,000	81,000 to 90,000	91,000 to 100,000
Andhra Pradesh	4	9	5	2	-	-	1	-	-	-	-
Assam	-	8	-	1	1	1	2	1	-	-	-
Bihar	-	7	3	-	-	-	-	-	-	-	-
Delhi	3	14	4	5	5	2	1	1	2	3	2
Goa	1	-	-	-	-	-	-	-	1	-	-
Gujarat	4	26	1	1	1	-	1	-	1	1	1
Himachal Pradesh	-	1	-	-	-	-	1	-	-	1	1
Kerala	4	26	9	1	2	2	1	1	2	-	-
Madhya Pradesh	1	8	4	3	-	-	-	-	-	-	-
Madras	11	66	22	16	6	4	2	1	2	3	2
Maharashtra	23	81	21	12	7	-	3	4	2	8	3
Manipur	-	2	-	1	-	-	-	-	-	-	-
Mysore	3	16	5	4	-	-	-	-	-	-	-
Orissa	-	-	1	-	-	1	-	-	-	-	-
Punjab	4	54	17	5	2	4	1	5	2	1	4
Rajasthan	2	17	3	2	1	2	-	-	-	-	-
Tripura	-	-	1	-	-	-	-	-	-	-	-
Uttar Pradesh	10	53	17	12	5	4	2	-	1	1	1
West Bengal	4	25	5	1	3	5	1	4	-	2	3
Total	74	413	118	66	33	26	16	17	13	20	17

State/Union Territory	Range of Output in Rupees						Total
	1 to 5 lakhs	6 to 10 lakhs	11 to 15 lakhs	16 to 20 lakhs	21 to 25 lakhs	Above 25 lakhs	
Andhra Pradesh	1	-	1	-	-	-	23
Assam	1	-	-	-	-	-	15
Bihar	-	-	-	-	-	-	10
Delhi	13	2	1	1	-	3	62
Goa	2	-	-	1	-	-	5
Gujarat	1	-	-	-	-	-	39
Himachal Pradesh	-	-	-	-	-	-	4
Kerala	1	2	1	1	-	-	53
Madhya Pradesh	-	-	-	-	-	-	16
Madras	7	1	-	-	-	-	143
Maharashtra	23	5	2	1	2	4	202
Manipur	-	-	-	-	-	-	3
Mysore	5	1	-	-	-	-	35
Orissa	1	-	-	-	-	-	3
Punjab	12	1	-	-	-	-	112
Rajasthan	-	-	-	-	-	-	27
Tripura	-	-	-	-	-	-	4
Uttar Pradesh	10	2	1	-	-	6	125
W. Bengal	11	1	1	-	-	2	68
Total	88	15	7	4	2	17	946

Scurce: Directorate of Marketing & Inspection, Nagpur.

PATTERN OF PACKAGING - PRODUCTWISE
(61 surveyed units*)

		Quantity (Tonnes)	Share in Total (%)
	1. MANGO PRODUCTS		
(a)	**Mango Slices**	**1,497**	**100**
	A 2½ can	1,388	93
	No. 1 Tall can	89	6
	Others	20	1
(b)	**Mango Pulp**	**828**	**100**
	A 2½ can	381	46
	No. 1 Tall can	12	1
	5-lb can	435	53
(c)	**Mango Juice**	**355**	**100**
	A 2½ can	129	36
	No. 1 Tall can	9	3
	5½-oz can	82	23
	Bottles	135	38
(d)	**Mango Nectar**	**348**	**100**
	A 2½ can	267	77
	5½-oz can	49	14
	Bottles	32	9
(e)	**Mango Squash**	**142**	**100**
	24-oz bottle	98	69
	Other bottles	44	31
(f)	**Mango Jam**	**133**	**100**
	A 2½ can	5	4
	1-lb can	56	42
	3.4-kg can	10	7
	1-lb jar	62	47

*Data relate to 1965.

	Quantity (Tonnes)	Share in Total (%)
(g) Mango Pickle	387	100
A 2½ can	17	4
Bottles	370	96
(h) Mango Chutney	288	100
34-oz bottle	44	15
17-oz bottle	26	9
8½-oz bottle	35	12
Other bottles	80	28
25 gallon barrel	35	12
50 " "	68	24
Total Mango Products	3,978	

2. PINEAPPLE PRODUCTS

(a) Pineapple Slices	1,310	100
A 2½ can	1,030	79
No. 1 Tall can	111	8
Bottles	169	13
(b) Pineapple Titbits	78	100
A 2½ can	78	100
(c) Pineapple Pulp	51	100
A 2½ can	51	100
(d) Pineapple Juice	1,142	100
A 2½ can	670	59
No. 1 Tall can	202	17
5½-oz can	86	8
5-lb can	63	6
Bottles	121	10

	Quantity (Tonnes)	Share in Total (%)
(e) Pineapple Jam	430	100
A 2½ can	42	10
1-lb can	55	13
5-lb can	51	12
1-lb bottle/jar	248	58
Others	34	7
Total Pineapple Products	3,011	

3. ORANGE PRODUCTS

(a) Orange Pulp	45	100
A 2½ can	2	5
5-lb can	43	95
(b) Orange Juice	266	100
A 2½ can	141	53
No. 1 Tall can	31	12
5½-oz can	10	4
5-lb can	73	27
6-oz bottle	11	4
(c) Orange Squash	670	100
24-oz bottle	628	94
Other bottles	42	6
(d) Orange Syrup	388	100
A 2½ can	366	94
Bottles	22	6
(e) Orange Marmalade	166	100
A 2½ can	18	11
1-lb can	47	28
1-lb jar	60	36
Others	41	25

	Quantity (Tonnes)	Share in Total (%)
(f) Orange Jelly	36	100
Large bottles	13	36
Small bottles	23	64
Total Orange Products	1,571	

4. LIME PRODUCTS

(a) Lime Juice	317	100
24-oz bottle	274	86
Other bottles	43	14
(b) Lime Squash	793	100
24-oz bottle	566	71
Other bottles	227	29

5. GUAVA PRODUCTS

(a) Guava Slices	297	100
A 2½ can	278	93
No. 1 Tall can	11	4
18-oz can	8	3
(b) Guava Juice	15	100
A 2½ can	4	27
No. 1 Tall can	4	27
5½-oz can	6	40
800-ml bottle	1	6
(c) Guava Nectar	35	100
A 2 can	23	66
5½-oz can	12	34
(d) Guava Jam	8	100
No. 1 Tall can	8	100

	Quantity (Tonnes)	Share in Total (%)
(e) Guava Jelly	162	100
A 2½ can	12	7
1-lb can	40	25
3.4-kg can	4	2
1-lb jar	19	12
Bottles	87	54
Total Guava Products	517	

6. APRICOT PRODUCTS

(a) Apricots in Syrup	8	100
A 2½ can	5	63
No. 1 Tall can	3	37
(b) Apricot Pulp	14	100
A 2½ can	11	79
5-lb can	3	21
(c) Apricot Jam	244	100
A 2½ can	16	7
1-lb can	155	63
1-lb jar	58	24
3.4-kg can	15	6
Total Apricot Products	266	

7. STRAWBERRY PRODUCTS

(a) Strawberry in Syrup	14	100
24-oz bottle	14	100
(b) Strawberry Pulp	15	100
A 2½ can	13	87
5-lb can	2	13

	Quantity (Tonnes)	Share in Total (%)
(c) Strawberry Jam	144	100
A 2½ can	3	2
No. 1 Tall can	94	65
1-lb jar	44	31
5-lb can	3	2
Total Strawberry Products	173	

8. TOMATO PRODUCTS

(a) Tomato Puree	240	100
A 2½ can	177	74
No. 1 Tall can	22	9
5-lb can	37	15
Bottles	4	2
(b) Tomato Juice	504	100
A 2½ can	352	70
No. 1 Tall can	68	13
5½-oz can	8	2
Bottles	76	15
(c) Tomato Soup	105	100
A 2 can	8	7
No. 1 Tall can	25	24
12-oz bottle	54	52
Other bottles	18	17
(d) Tomato Sauce & Ketchup	1,102	100
A 2½ can	25	2
No. 1 Tall can	32	3
Bottles	1,045	95
Total Tomato Products	1,951	

	Quantity (Tonnes	Share in Total (%)
9. POTATOES		
Canned Potatoes	2,057	100
A 2½ can	2,057	100
Total Potatoes Products	2,057	
10. PEAS		
Canned Peas	2,227	100
A 2½ can	1,694	76
No. 1 Tall can	397	18
Others	136	6
Total Peas Products	2,227	

SIZEWISE PATTERN OF PRODUCTION
(61 surveyed units*)

(Tonnes)

	A2½ can
Mango Products	**2,185**
Slices	1,388
Pulp	379
Juice	129
Nectar	267
Jam	5
Pickles	17
Pineapple Products	**1,871**
Slices	1,030
Titbits	78
Pulp	51
Juice	670
Jam	42
Orange Products	**527**
Pulp	2
Juice	141
Syrup	366
Marmalade	18
Guava Products	**294**
Slices	278
Juice	4
Jelly	12
Apricot Products	**32**
Fruit in syrup	5
Pulp	11
Jam	16
Strawberry Products	**16**
Pulp	13
Jam	3

* Data relate to 1965.

	A 2½ can
Tomato Products	554
Puree	177
Juice	352
Sauce & Ketchup	25
Potatoes	2,057
Peas	1,694
Other Fruit and Vegetable Products	2,423
Total A 2½ can	11,653
	No. 1 Tall/1-lb can
Mango Products	166
Slices	89
Pulp	12
Juice	9
Jam	56
Pineapple Products	313
Slices	111
Juice	202
Orange Products	78
Juice	31
Marmalade	47
Guava Products	63
Slices	11
Juice	4
Jam	8
Jelly	40
Apricot Products	158
Fruit in syrup	3
Jam	155
Strawberry Products	94
Jam	94

	No. 1 Tall/1-lb can
Tomato Products	147
Puree	22
Juice	68
Soup	25
Sauce & Ketchup	32
Peas	397
Other Fruits and Vegetable Products	761
Total No. 1 Tall/1-lb can	2,177
	5½-oz can
Mango Products	131
Juice	82
Nectar	49
Pineapple Juice	86
Orange Juice	10
Guava Products	18
Juice	6
Nectar	12
Tomato Juice	8
Total 5½-oz can	253
	5-lb "Dalda" can
Mango Pulp	435
Pineapple Products	114
Juice	63
Jam	51
Orange Products	116
Pulp	43
Juice	73

	5-lb "Dalda" can
Apricot Pulp	3
Strawberry Products	5
Pulp	2
Jam	3
Tomato Puree	37
Total 5-lb "Dalda" can	710

	3.4-kg can
Mango Jam	10
Guava Jelly	4
Apricot Jam	15
Other Fruit Products	53
Total 3.4-kg can	82

	1-lb Bottle/Jar
Mango Jam	62
Pineapple Jam	248
Orange Marmalade	60
Guava Jelly	19
Apricot Jam	58
Strawberry Jam	44
Other Fruit Products	258
Total 1-lb Bottle/Jar	749

	24-oz Bottle
Mango Squash	98
Orange Squash	628
Lime Products	840
Juice	274
Squash	566
Strawberry Syrup	14
Total 24-oz Bottle	1,580

	Other Bottles
Mango Products	766
Juice	135
Nectar	32
Squash	44
Pickles	370
Chutneys	185
Pineapple Products	290
Slices	169
Juice	121
Orange Products	111
Juice	11
Squash	42
Syrup	22
Jelly	36
Lime Products	270
Juice	43
Squash	227
Guava Products	88
Juice	1
Jelly	87
Tomato Products	1,197
Puree	4
Juice	76
Soup	72
Sauce & Ketchup	1,045
Other Fruit and Vegetable Products	802
Total Other Bottles	3,524

Source: Field Survey.

PAPAYA - CFTRI SCHEME FOR THE PRODUCTION OF 4 TONNES OF PAPAIN AND PECTIN

Papaya plants generally start bearing fruits about 6 months after transplantation of the seedlings and the fruits will be ready for extraction of papain about three months later; when the plantation is maintained for three years, papain could, therefore, be extracted for about $2\frac{1}{2}$ years.

During the first nine months, expenditure will be limited to the raising of the plantations and will increase in the subsequent period to meet processing charges. The total cost of raising the plantation and maintaining it for 3 years would be approximately Rs 1,500/- per acre (500 plants/acre), with Rs 750/- in the first, Rs 375/- in the second and Rs 375/- in the third years. It is assumed that land for growing the papaya would be available on lease at about Rs 400/- per acre per annum. The total expenses on 35 acres for 3 years would thus be 194,500/- (Rs 1,500 x 35 plus Rs 400 x 35 x 3 = 52,500 + Rs 42,000).

Production of Papain and Pectin

Plantation area: 35 acres (500 bearing plants per acre)

Working days: 300 per annum

Production basis:

a) Papain	I Year, last 3 months only	700 kg.	(@ 9 kg./day)
	II Year	2100 kg.	(@ 7 kg./day)
	III Year	1200 kg.	(@ 4 kg./day)
	Total	4000 kg.	

b) Pectin I Year, last 3 months only 1800 kg.(@ 25 kg./day)
II Year 5400 kg.(@ 18 kg./day)
III Year 4800 kg.(@ 16 kg./day)
12,000

Note: About 2500 trees will have to be tapped daily. The yield of fruits in the 1st, 2nd and 3rd years would be approximately 240,750 and 610 tonnes respectively.

A. Raw Materials: Seed under cost of production

B. Capital Outlay:

1. Land and building: An area of about 10,000 sq. ft. with built up area being 5,000 sq. ft. with the usual factory type construction and fly-proofed Rs 12/- per sq. ft.	Rs	60,000
2. Plant and equipment: As per details given separately (item D)	Rs	73,000
3. Installation and erection charges (10% of plant and machinery)	Rs	7,300
4. Furniture and office equipment	Rs	2,000
5. Internal and external transport facilities etc.	Rs	4,700
	Rs	147,000

C. Investment Block

1. Fixed capital investment	Rs	1,47,00
2. Capital for raising plantation in the year	Rs	26,250
3. Approximate , working capital to cover the cost of raw materials, non-consumable stores, containers, fuel and labour (data based on 3 months' working cost)	Rs	35,100
	Rs	208,350

D. Plant, Machinery and Equipment:

	Approx. power required H.P. Hrs.	Kwh.	No.	Rate	Total Cost
1. Slicing machine (2 tons/hr.)	5 x 1.5	5.5	1	4,000	4,000
2. Rasping, or mincing machine (2 tons/hr)	5 x 1.5	5.5	1	6,000	6,000
3. Vibrating sieve mechanically operated, fitted with 60 mesh sieve	2 x 1.5	2.5	1	4,000	4,000
4. Vacuum shelf drier (25 c. ft. drying areas)	5 x 8	30.0	1	12,000	12,000
5. Boiler (500 kg. low pressure (steam/hr)	1.5 x 2	2.5	1	10,000	10,000
6. Mechanical stirrers (0.5 HP) low-speed 50-100 rpm)	1.5 x 2	2.5	3	1,000	3,000
7. Wooden basket presses, screw type (0.6 m. dia. x 6 m. ht. basket)	-	-	3	1,000.	3,000
8. Pumping equipment (0.5 HP)	1 x 2	1.5	2	1,500	3,000
9. Grinder (powdering machine) (10 kg./ hr)	2 x 2	3.0	1	2,000	2,000
10. Vacuum sealing machine	-	-	1	3,000	3,000
11. Wooden filter press (60 cm x 60 cm. frames, 12 Ns.)	-	-	1	3,000	3,000
12. Cement concrete tanks of 2,500, 1 capacity fitted with steam injecting coils	-		2	1,500	3,000

	Approx. power required E.P. Hrs. Kwh.	No.	Rate	Total
13. Cement concrete tanks of 700,1 capacity	- - -	3	1,000	3,000
14. Misc. equipment, such as small vessels, knives, sieves, weighing machine etc.	- - -	-	-	12,000
15. Lab. equipment, glass ware etc.	- - -	-	-	2,000

NB: It is assumed that facilities for the recovery of alcohol are available at some distillery

Total 73,000

E. Factory staff (for 2¼ years of production)

	No.	Salary/p.m.	Total
1. Production Manager-cum-Chemist	1	500	13,500
2. Production Assistants	2	200	10,800
3. Store-keeper-cum-Accountant	1	150	4,050
4. Typist-cum-clerk	1	150	4,050
5. Peon, Watchman and Boiler-man	3	75	6,075
6. Mechanic	1	100	2,700
7. Sweepers	2	50	2,700
8. Skilled labour	10	100	27,000
9. Unskilled labour (35 persons per month in the first 15 months and 28 persons per month during the last 12 months)	32	60	51,840
		Total	122,715

F. Utilities	Total Rs
1. Electric power for the process 60,000 KWH at 0.09/KWH	5,400
2. Steam (low pressure) 1200 tons at Rs 10.00/ton	12,000
3. Water 6,000,000 gal. at Rs 0.50/ 1000 gal.	3,000
4. Engineering @ 5% per annum on plant (Rs 8,212) services and 3% per annum on bldg. (Rs 4,050)	12,262
	32,662

Cost of Production of 12 Tonnes of Pectin and 4 Tonnes of Papain

Particulars	Quantity required	Rate Rs	Total Cost Rs	Ratio between pectin & papain	Cost per kg Pectin	Cost per kg Papain
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Raw Materials						
1. Papayas	35 acres	2,700	94,500	1:3	1.74	17.62
2. Hydrochloric acid (Comm.)	22,000 L	0.50	11,000	1:0	0.92	
3. Aluminium sulphate (Comm.)	20,000 kg	0.55	11,000	1:0	0.92	
4. Liquor ammonia (Comm.)	1,200 L	3.50	4,200	1:0	0.35	
5. Sodium hydro-xide	6,000 kg	0.80	4,800	1:0	0.40	
6. Alcohol lost in the process (10% of the total used)	4,800 gal	2.00	9,600	1:0	0.80	
7. Alcohol re-covery charges	43,000 gal	0.20	8,600	-	0.72	
8. Potassium meta-bisulphite	560 kg	8.00	4,480	-	0.32	0.30
Total of 'A'			1,48,180		6.17	17.92

(1)	(2)	(3)	(4)	(5)	(6)	(7)
B. Utilities						
1. Electric power	60,000 KWH	0.09	5,400	3:1	0.34	0.34
2. Steam (low pressure)	1,200 tons	10.00	12,000	1:0	1.00	
3. Water	60 lakh gal	0.50/ 1000 gal.	3,000	-	0.25	Neg.
4. Engineering @ 5% per annum on plant service & 3% per annum on buildings			8,212 4,050	3:1	0.77	0.77
Total of 'B'			32,662		2.36	1.11
C. Labour, supervision and administrative charges: as per details in the scheme			1,22,715	1:1	5.11	15.34
D. Packing: 10 kg. of papain and 12.5 kg of pectin to be packed into each 4 gal. friction top tins and taggers fixed firmly. These tins to be duly packed in wooden crates	1,360	4.00	5,440	2:4	0.32	0.40
Total of C+D			1,28,155		5.43	15.74
E. Factory overheads (variable)						
1. Insurance, taxes etc. per annum	1,000		6,750	3:1	0.42	0.42
Stationery & Allied expenses per annum	1,000					
Other welfare amenities per annum	1,000					
F. Factory overheads (fixed)						
1. Depreciation at 10% per annum on plant and equipment and 5% per annum on building			16,425 6,750	-	-	-

(1)	(2)	(3)	(4)	(5)	(6)	(7)
2. Interest @ 6% per annum on						
(a) Initial investment on Rs 26,250 for raising and maintaining the plantation for 3 years		4,725	-		-	-
(b) Working capital of Rs 35,000 for 2¼ years		4,738	3:1		2.04	2.04
Total of 'E' & 'F'		39,388			2.46	2.46
Total cost, prime and overheads		3,48,385			16.44	37.23
Add trade charges @ 20%		69,677			3.29	7.45
		4,18,062			19.73	44.68

Profit & Loss Account

	Income	Expenditure	Profit
Pectin 12,000 kg @ Rs 22/kg	2,64,000	2,36,760	27,240
Papain 4,000 kg @ Rs 55/kg	2,20,000	1,78,240	41,760
	4,84,000	4,15,000	69,000

i.e. Rs 69,000 in 2¼ years, for an investment of Rs 2,08,350/- or 14.7% dividends per annum.

Source: Central Food Technological Research Institute, Mysore.

ONIONS - CFTRI SCHEME FOR SETTING UP OF A DEHYDRATION PLANT

Cost of Production

Basis: 300 working days per annum; 50 tonnes of raw onions per day; 15,000 tonnes of raw onions.

Yield on unprepared basis: 1.9

1,667 tonnes of dried product
(net packed in tins for shipment)

		Raw Materials @ Rs 80/ton		Raw Materials @ Rs 150/ton
I.	Raw material - 15,000 tonnes	12,00,000		22,50,000
II.	Labour and supervision	4,95,000		4,95,000
III.	Utilities			
	a) Steam 34,200 tonnes @ Rs 2.28 tonnes/tonne of onions @ Rs 20/- per tonne	6,84,000		
	b) Water @ 10,000 gallons per tonne of raw onions 150,000,000 @ Rs 0.5 per 1,000 gallons	75,000		
	c) Power @ 96 KWH/tonnes of raw onions - 14,40,000 KWH @ Rs 0.1 per KWH	1,44,000	9,03,000	9,03,000
IV.	Packaging			
	4,07,500 gallon lever lid tins and crating at Rs 2.50 per tin		10,18,750	10,18,750
V.	Over-heads			
	a) Depreciation, interest & insurance			
	i) 10% depreciation on capital investment	4,20,000		

ii) 6% interest on working capital	1,20,000		
iii) 1% insurance on capital investment	42,000		
	5,82,000		
b) Directorate & General administration, accounting & sales expenses	1,20,000	7,02,000	7,02,000
Total expenses per annum		43,18,750	53,68,750
	or	43,20,000	53,70,000

Source: Central Food Technological Research Institute, Mysore.

PROCESSED FRUITS AND VEGETABLES
EXPORTS

ANNEXURE B-16(a)

EXPORTS OF PROCESSED FRUITS AND VEGETABLES

Qty. Quantity in Tonnes
Val. Value in Rs '000

Product Group	1961-62		1962-63		1963-64		1964-65	
	Qty.	Val.	Qty.	Val.	Qty.	Val.	Qty.	Val.
Pulps & Pastes	65	184	47	90	54	133	129	388
Juices, Squashes, Syrups etc.	73	184	116	225	487	735	887	1,410
Canned/Bottled Fruits	207	301	320	511	263	443	540	887
Candied/Crystallised Fruits	61	120	29	77	44	115	136	225
Jams, Jellies and Marmalades	11	28	6	18	8	22	27	59
Other Fruit Products	229	232	258	313	132	199	189	286
Mango Slices in brine	-	-	-	-	-	-	455	501
Pickles	1,211	2,301	1,336	2,517	1,925	2,484	1,397	2,774
Chutneys	490	1,169	662	1,509	653	1,580	614	1,573
Canned Vegetables	121	416	209	989	280	1,480	176	1,899
Dehydrated Vegetables	31	51	32	67	16	33	22	47

Product Group	1961-62 Qty.	1961-62 Val.	1962-63 Qty.	1962-63 Val.	1963-64 Qty.	1963-64 Val.	1964-65 Qty.	1964-65 Val.
Other Vegetable Products	10	24	20	43	15	37	10	29
Total	2,509	5,010	3,035	6,359	3,247	7,161	4,582	10,078

Note: As there was change in classification of Statistics after 1964-65, exports during the subsequent years are shown separately at Annexure B-16(b).

Source: DGCI&S, Calcutta.

ANNEXURE B-16(b)

EXPORTS OF PROCESSED FRUITS AND VEGETABLES

Q: Quantity in Tonnes
V: Value in Rs '000

Product	1965-66		1966-67		1967-68	
	Q	V	Q	V	Q	V
Fruits, Fruit Peels, Parts of Plants Preserved by Sugar	14	40	4	20	1	7
Jams, Marmalades, Jellies, Purees and Pastes	203	403	71	235	91	361
a) Mango Jam etc.	164	333	51	178	76	280
b) Other Jams etc.	39	70	20	57	15	81
Fruit and Vegetable Juices Unfermented	1917	3412	2050	4878	3802	8765
a) Mango Juice	1357	1977	2010	4792	3338	7935
b) Other Juices	560	1435	40	86	464	830
Fruits Temporarily Preserved	629	829	455	1224	178	331
a) Fruits preserved by freezing without sugar	2	3	-	-	-	-
b) Fruits preserved by freezing with Sugar	55	169	42	167	4	18
c) Mango Slices in brine	548	613	273	615	149	249
d) Others	24	44	140	442	25	64
Fruits and Nuts prepared or preserved n.e.s.	96	276	155	645	197	705
a) Fruits etc. preserved in Syrup	89	251	131	506	151	566
b) Others	7	25	24	139	46	139
Dehydrated Vegetables	36	1845	37	2558	19	2175
a) Mushrooms	25	1817	34	2539	18	2167
b) Others	11	28	3	19	1	8

Product	1965-66 Q	1965-66 V	1966-67 Q	1966-67 V	1967-68 Q	1967-68 V
Vegetables preserved or prepared, n.e.s.	1890	4133	2071	5700	1901	6030
a) Mango Chutney etc. with Sugar	1164	2350	1255	3419	1072	3326
b) Mango Chutney & Pickle etc. without sugar	418	813	454	1108	317	761
c) Vegetables in airtight container	118	207	31	68	48	166
d) Others	349	763	331	1105	464	1777
Total	4785	10937	4843	15260	6189	18374

Source: Monthly Statistics of the Foreign Trade of India Vol. 1, D.G.C.I.& S; Calcutta

PROCESSED FRUITS AND VEGETABLES
COST OF PRODUCTION

ANNEXURE B-17(a)

BREAK-UP OF EXPORTS BY MAJOR DESTINATIONS

Q: Quantity in Tonnes
V: Value in Rs '000

Destination		1961-62 Q	1961-62 V	1962-63 Q	1962-63 V	1963-64 Q	1963-64 V	1964-65 Q	1964-65 V
UK		1,238	1,905	1,924	3,031	1,569	2,592	1,951	3,235
	(a)	825	1,421	1,249	2,093	974	1,684	938	1,761
	(b)	413	484	675	938	595	1,008	1,013	1,474
USA		182	545	165	501	174	547	200	609
	(a)	167	501	164	496	167	526	197	596
	(b)	15	44	1	5	7	21	3	13
Iraq		307	531	210	413	283	520	358	584
	(a)	304	522	208	409	283	520	356	579
	(b)	3	9	2	4	-	-	2	5
Switzerland		23	167	16	424	18	744	22	1,291
	(a)	2	7	1	2	2	4	4	8
	(b)	21	160	15	422	16	740	18	1,283
Kuwait		49	125	129	273	106	221	166	344
	(a)	20	44	47	113	59	132	79	183
	(b)	29	81	82	160	47	89	87	161
Saudi Arabia		50	83	120	204	150	251	361	608
	(a)	38	57	52	83	45	79	98	168
	(b)	12	26	68	121	105	172	263	440

Destination		1961-62		1962-63		1963-64		1964-65	
		Q	V	Q	V	Q	V	Q	V
Malaysia		27	83	69	207	78	173	77	245
	(a)	26	81	49	162	33	166	48	182
	(b)	1	2	20	45	45	57	29	63
France		6	122	6	206	3	179	6	321
	(a)	-	-	Neg		Neg		2	10
	(b)	6	122	6	206	3	179	4	311
USSR		-	-	-	-	395	576	989	1,578
	(a)	-	-	-	-	70	124	Neg	Neg
	(b)	-	-	-	-	325	452	989	1,578
Other countries		627	1,449	396	1,100	471	1,258	452	1,263
	(a)	319	837	228	668	315	829	289	860
	(b)	308	612	168	432	156	429	163	403
Total		2,509	5,010	3,035	6,359	3,247	7,161	4,582	10,078
	(a)	1,701	3,470	1,998	4,026	1,948	4,014	2,011	4,347
	(b)	808	1,540	1,037	2,333	1,299	3,147	2,571	5,731

Notes: 1. (a) Stands for Pickles & Chutneys
(b) " Other Products

2. As there was change in classification of statistics after 1964-65, break-up of exports during the subsequent years are shown separately at Annexure B-17(b)

Source: DGCI&S, Calcutta

ANNEXURE B-19(b)

BREAK-UP OF EXPORTS BY MAJOR DESTINATIONS

Q: Quantity in Tonnes
V: Value in Rs '000

Destination	1965-66		1966-67		1967-68	
	Qty	Val	Qty	Val	Qty	Val
UK	1,769	2,883	1,698	4,307	1,543	4,223
a)	7	21	25	80	47	193
b)	6	40	44	147	118	240
c)	838	1,373	1,027	2,420	825	2,073
d)	497	495	165	259	144	236
e)	421	954	437	1,401	409	1,481
USA	276	709	196	779	200	896
a)	1	4	1	4	1	12
b)	-	-	-	-	1	3
c)	256	648	163	607	144	628
d)	-	-	1	4	1	2
e)	19	57	31	164	53	251
USSR	1,734	2,491	1,597	3,641	2,412	4,918
a)	118	263	-	-	-	-
b)	1,491	2,016	1,397	2,984	2,412	4,918
c)	75	100	-	-	-	-
d)	50	112	100	328	-	-
e)	-	-	100	329	-	-
Iraq	207	376	203	382	93	118
a)	-	-	-	-	-	-
b)	-	-	-	-	-	-
c)	206	373	200	381	93	118
d)	-	-	-	-	-	-
e)	1	3	3	1	-	-

Destination	1965-66		1966-67		1967-68	
	Qty	Val	Qty	Val	Qty	Val
Kuwait	192	550	512	1,467	1,034	3,025
a)	19	14	4	11	20	69
b)	149	464	446	1,266	814	2,360
c)	12	31	36	115	14	50
d)	-	-	-	-	-	-
e)	12	41	26	75	186	546
Saudi Arabia	263	410	54	150	212	547
a)	43	68	8	27	11	35
b)	163	253	15	51	180	455
c)	54	84	29	65	17	38
d)	-	-	-	-	-	-
e)	3	5	2	7	4	19
France	5	261	10	573	7	676
a)	-	-	-	-	-	-
b)	-	-	-	-	-	-
c)	1	3	1	6	1	6
d)	-	-	-	-	Neg	Neg
e)	4	258	9	567	6	670
Malaysia	46	141	24	73	10	40
a)	1	2	Neg	1	Neg	1
b)	4	8	Neg	1	Neg	1
c)	26	97	21	63	5	22
d)	Neg	2	-	-	-	-
e)	15	32	3	8	5	16
Singapore	-	-	42	166	52	191
a)	-	-	Neg	2	Neg	2
b)	-	-	9	32	2	6
c)	-	-	26	112	35	126
d)	-	-	-	-	-	-
e)	-	-	7	20	15	57

Destination	1965-66		1966-67		1967-68	
	Qty	Val	Qty	Val	Qty	Val
Switzerland	25	1,458	28	1,962	15	1,125
a)	-	-	-	-	-	-
b)	Neg	1	Neg	1	-	-
c)	1	1	1	1	3	6
d)	-	-	-	-	-	-
e)	24	1,456	27	1,960	12	1,119
Other Countries	268	1,658	479	1,760	611	2,615
a)	14	31	33	110	12	49
b)	104	630	139	397	275	782
c)	113	453	205	757	252	1,027
d)	1	4	7	27	4	11
e)	36	540	95	469	68	746
Total	4,785	10,937	4,843	15,260	6,189	18,374

Note: a) Jams, Jellies, Purees & Pastes
b) Fruit & Vegetable Juices unfermented
c) Mango Pickles & Chutneys
d) Mango Slices in brine
e) Others fruit & Vegetables preserved

Source: DGCI & S, Calcutta. (Published and Unpublished).

ANNEXURE B-18

COST OF PRODUCTION - MANGO SLICES

Cost of one case = 24 x 850 gms (A 2½ Tins)

	Bombay		Allahabad	
	Rs	%	Rs	%
Mangoes	31.50	40.0	28.80	40.6
Sugar	4.38	5.6	5.22	7.3
Labour	4.80	6.0	4.00	5.6
Chemicals, Electricity etc.	1.32	1.7	1.32	1.8
Cans	12.24	15.5	13.20	18.6
Labels	1.00	1.2	1.20	1.7
Outer packaging	4.00	5.0	3.10	4.3
Overheads	19.76	25.0	14.21	20.1
Total	79.00	100.0	71.05	100.0

Source: Field Survey

COST OF PRODUCTION - MANGO PULP

Cost of one case = 24 x 850 gms (A 2½ Tins) (Bombay)

	Rs	%
Mangoes	31.50	40.5
Sugar	4.71	5.9
Labour	4.50	5.7
Chemicals, Electricity etc.	1.00	1.2
Cans	12.24	15.5
Labels	1.00	1.2
Outer packaging	4.00	5.0
Overheads	19.65	25.0
Total	78.60	100.0

Source: Field Survey

ANNEXURE B-20

COST OF PRODUCTION - PINEAPPLE SLICES

Cost of one case = 24 x 850 gms (A 2½ Tins)

(Bangalore)

	Rs	%
Pineapple	12.76	29.0
Sugar	8.28	18.0
Labour	1.50	3.6
Chemicals, Electricity etc.	1.23	2.6
Cans	12.36	25.9
Labels	0.60	1.4
Outer packaging	2.28	4.9
Overheads	6.73	14.6
Total	45.74	100.0

Source: Field Survey

ANNEXURE B-21

COST OF PRODUCTION - ORANGE SEGMENTS

Cost of one case = 48 x 310 gms

(Nagpur)

	Rs	%
Oranges	17.63	32.0
Sugar	3.13	5.7
Labour	2.48	5.5
Chemicals, Electricity etc.	1.30	2.4
Cans	17.52	31.0
Labels	1.30	2.4
Outer packaging	2.90	5.0
Overheads	8.71	16.0
Total	54.97	100.0

Source: Field Survey

ANNEXURE B-22

COST OF PRODUCTION - ORANGE SQUASH

Cost of one case = 12 x 240 oz (bottles)

(Bangalore)

	Rs	%
Oranges	2.70	9.0
Sugar	12.45	40.5
Labour	0.60	2.0
Chemicals, Electricity etc.	1.50	5.0
Bottles	4.46	14.9
Labels	0.30	1.0
Outer packaging	4.17	13.9
Overheads	4.11	13.7
Total	30.29	100.0

Source: Field Survey

ANNEXURE B-23

COST OF PRODUCTION - GUAVA SLICES

Cost of one case = 24x 850 gms (A 2½ Tins)
(Allahabad)

	Rs	%
Guava	14.10	25.6
Sugar	6.66	12.1
Labour	4.00	7.3
Chemicals, Electricity etc.	2.10	3.3
Cans	13.20	24.0
Labels	1.20	2.1
Outer packaging	3.00	5.6
Overheads	11.06	20.0
Total	55.32	100.0

Source: Field Survey

COST OF PRODUCTION - GUAVA JUICE

Cost of one case = 48 x 450 gms (1 lb Tins)

(Allahabad)

	Rs	%
Guava	7.05	15.0
Sugar	4.35	9.2
Labour	2.00	4.2
Chemicals, Electricity etc.	1.00	2.1
Cans	18.24	39.0
Labels	2.00	4.2
Outer packaging	3.00	6.3
Overheads	9.41	20.0
Total	47.05	100.0

Source: Field Survey

COST OF PRODUCTION - GUAVA JELLY

Cost of one case = 48 x 450 gms (1lb Tins)

(Allahabad)

	Rs	%
Guava	6.18	11.5
Sugar	10.44	19.7
Labour	1.00	1.8
Chemicals, Electricity etc.	2.00	3.7
Cans	18.24	33.7
Labels	2.00	4.0
Outer packaging	3.00	5.6
Overheads	10.71	20.0
Total	53.57	100.0

Source: Field Survey

ANNEXURE B-26

COST OF PRODUCTION - FRUIT COCKTAIL

Cost of one case = 24 x 850 gms (A 2½ Tins)

(Allahabad)

	Rs	%
Pineapple	7.20	10.2
Mangoes	3.36	4.8
Peaches	6.24	8.9
Pears	7.20	10.2
Cherries	3.80	5.4
Sugar	4.80	6.9
Labour	4.00	5.7
Chemical, Electricity etc.	2.30	3.3
Cans	13.20	19.0
Labels	1.20	1.3
Outer packaging	3.00	4.3
Overheads	14.08	20.0
Total	70.38	100.0

Source: Field Survey

ANNEXURE B-27

COST OF PRODUCTION - TOMATO JUICE

Cost of one case = 24 x 850 gms (A 2½ Tins) (Bombay)

	Rs	%
Tomatoes	16.25	28.5
Sugar	3.70	6.5
Labour	3.00	5.3
Chemicals, Electricity etc.	2.55	4.4
Cans	12.24	21.5
Labels	1.00	1.8
Outer packaging	4.00	7.0
Overheads	14.26	25.0
Total	57.00	100.0

Source: Field Survey

COST OF PRODUCTION - TOMATO KETCHUP

Cost of one case = 24 x 130 oz (Bottles)

(Bangalore)

	Rs	%
Tomatoes	5.91	18.4
Sugar	7.40	23.1
Labour	0.75	2.3
Chemicals, Electricity etc.	1.50	4.3
Bottles	6.40	20.0
Labels	0.60	1.8
Outer packaging	5.23	16.1
Overheads	4.54	14.0
Total	32.33	100.0

Source: Field Survey

COST OF PRODUCTION - GREEN PEAS

Cost of one case = 24 x 850 gms (A 2½ Tins)

(Allahabad)

	Rs	%
Peas	16.25	33.9
Sugar	0.88	1.8
Labour	2.00	4.5
Chemicals, Electricity etc.	1.60	3.5
Cans	13.20	27.5
Labels	1.20	2.5
Outer packaging	3.00	6.3
Overheads	9.50	20.0
Total	47.63	100.0

Source: Field Survey

UNITS CONTACTED
DURING THE
SURVEY

UNITS CONTACTED DURING THE SURVEY

A. Western Region

D. & P. Products Ltd
Main Bombay-Agra Road
Bhandup
Bombay-78

James Smith & Co
Shreeniwas House
Waudby Road, Fort
Bombay

M.M. Poonjiajee & Co
42-1st Marine Street
Bombay-2

Merwaujee Poonjiajee & Sons
Pvt Ltd
Poonjiajee Building
Princess Dock, Fierre Road
Bombay-9

Dr. Writers Chocolate &
Canning Co
Bhawani Shanker Road
Dadar
Bombay-23

Mody & Co
Engineer Building
265 Princess Street
Bombay-2

Pure Products & Madhu
Canning Ltd
Sion Tombay Road
P.B. No. 720
Deonar Chamber
Bombay-71

Corn Products Co (India) Pvt Ltd
Shreeniwas House
Waudby Road, Fort
Bombay

A. Kalvert & Co
90/97 Mazagaon Road
Bombay-10

V.P. Badekar & Sons
Badekar Sadan No. 3
Tatya Gharpure Path
Bombay-4

Kantilal & Co
318 Samuel Street
P.B. No. 1504
Bombay-3

Jalgaon District Marketing
Society Ltd
Banana Powder Plant
Visauji Nagar
Jalgaon
Maharashtra

Fernendes
19, Frere Road
Kirkee
Poona-3

Goa Food Products
Margoa
Goa

Coasta & Co Ltd
Canning Factory, P.B. No. 16
Margoa (Goa)

Monte Do Silve Canning Factory
Near Old Market, Margoa
Goa

B. Northern Region

Honojams
Armwari
Raj Bagh Bridge
Srinagar

Harco Products Co
Sanat Nagar
Srinagar

Tulip Products Co
Raj Bagh
Sgrinagar

H.A. Rahim & Co
Raj Bagh, P.B. No. 9
Srinagar

Excel Food Industries
Below Gumat
Jammu

Sama Fruit Products Co
Sonpore
Kashmir

Deva Singh Amrik Singh
Shop No. 2176 Ward B
New Misri Bazaar
Amritsar

Atma Singh Bhola Singh
Shop No, 2225-26/6
New Misri Bazaar
Amritsar

Kashi Ram Sohan Lal
2228/6, New Misri Bazaar
Amritsar

Khanna Emporium
Ranikabagh
Amritsar

G.G. Fruit Preserving Factory
Haldwani
Distt. Nainital (U.P.)

D.D. Harishram Liladhar
Ship No. 2312/11-VL
New Misri Bazaar
Amritsar

Satya Vihar Export Co
P.O. Box No. 119
Batihata Lane
Amritsar

Jullundur Cooperative Canneries Ltd
Jullundur

H.P. Fruit Canning Unit
Naubahar
Simla-2

Solan Food Products Ltd
Solan (Simla Hills)

Northland Industries
Aziz Building, Chuna Road
Delhi

Harnarain Gopinath
Khari Baoli
Delhi

Excelsior Food and Canning Industries
Pahargunj
New Delhi

Rai & Sons Pvt Ltd
9-A Connaught Place
New Delhi

Mohan Meakin Bakeries Ltd
Mohan Nagar
Ghaziabad

Hindustan Lever Ltd
G.T. Road
Ghaziabad

Spencer & Co
G.T. Road, P.B. No. 121
Kanpur

S.R. Cannery
133 Rosulabad
Cavalry Lines
Allahabad

Hinutrition Food Corporation
Kamla Club, Kalpi Road
Kanpur

Allahabad Canning Co
P.O. Bamraouli
Allahabad

C. Eastern Region

Himalayan Fruit Preservers
P.O. Siliguri
District Darjeeling
West Bengal

Sreekisan Dutt & Co
128, Middle Road
Entally
Calcutta-14

Bhattacharya & Co
Machua Bazaar
Calcutta

Mida & Co (P) Ltd
33 Canning Street
Calcutta

Tims Products Ltd
P.O. Belgharia (24 Parganas)
Eastern Rly, West Bengal

Daw Sen & Co (P) Ltd
29 Dr. Suresh Sarkar Road
Entally
Calcutta-14

The Metal Box Co of India Ltd
Barlow House
59-C Chowringhee
Calcutta

D. Southern Region

Salchar Food Products
6-3-351 Punjagutta
Hyderabad-4

Shaw Wallace & Co Ltd.
Malkajgiri
Hyderabad

Dalmia (P) Ltd
Dalmia House
T. Nagar
Madras-28

Shri Ganesh Ram & Co
46 Thambuchetty Street
Madras

Rai & Sons
Kukkatapally
Hyderabad-16

P. Venkatachallam Condiments
Broadway
Madras-1

Fruitnik Products
Poonamalle High Road
Madras-10

Ambi's Pickles
No. 7 Broadway
Madras-1

Delicio Enterprises (P) Ltd
Poonamalle High Road
Madras-10

Bolsts' Indian Condiments
Yelichehalli
Bangalore

Sudha Processing Industries
Trichur

Kissan Products Ltd
Old Madras Road
Bangalore-16

Mysore Fruit Products Ltd
Rajaji Nagar
Bangalore-3

Darlco Canning Industries Ltd
Trichur

Kaycee Plantations & Cannings
High Road
Trichur

MARKETS AND MARKETING SOCIETIES CONTACTED DURING THE SURVEY

Agricultural Produce Market Committee
Manek Chowk Market
Ahmedabad

Potato Growers Co-operative Federation Ltd
Near Kamasa Gate
Ahmedabad

Gujarat State Co-operative Fruit & Vegetable Marketing Federation Ltd
Sardar Bag
Bardoli-2(Gujarat State)

Amalsad Vibhag V.K. Sahakari Mandali Ltd
Amalsad (W. Rly)
Bulsar District (Gujarat)

Agricultural Produce Market Committee
Billimora (W. Rly)
Bulsar District (Gujarat)

Surat District Co-operative Purchase & Sale Union Ltd
Surat (Gujarat)

Agricultural Produce Market Committee
Sardar Market
Sahara Darwaja
Surat (Gujarat)

The Maharashtra State Cooperative Marketing Federation Ltd
P.B. No. 5080
Kanmoor House
Narsi Natha Street
Bombay-9

Jammu & Kashmir Apex Co-operative Marketing Society
Jammu

Fruit and Vegetable Market
Subzi Mandi
Delhi

Fruit & Vegetable Market
Lucknow

Fruit & Vegetable Market
Varanasi

Fruit & Vegetable Market
Allahabad

Fruit & Vegetable Market
Haldwani (UP)

Fruit & Vegetable Market
Muzaffarpur

Fruit & Vegetable Market
Patna

Fruit & Vegetable Market
Siliguri

Fruit & Vegetable Market
Darjeeling

Fruit & Vegetable Market
Calcutta

Mirtan Mandi Vegetable Market
Hyderabad

Satter Vinery
Hyderabad

Kusum Vinery
Sahebnagar - Kusumnagar
Hyderabad-35

Hisamganj Vegetable Market
Secunderabad City

Fruit & Vegetable Market
Vizayawada

Kothwal Bazar Fruit & Vegetable Market
Madras

Fruit & Vegetable Marketing Society Ltd
Tudiyalur (Coimbatore)

Central City Market
Bangalore

Bangalore Grape Growers Marketing & Processing Society Ltd
Bangalore

Nilagiri District Potato Growers Co-operative Marketing Society
Ooty

The Fruit & Vegetable Co-operative Processing Society Ltd
Kushalnagar
Coorg

Coorg Orange Growers Co-operative Society Ltd
Polibetta
Coorg

Trichur Fruit & Vegetable Marketing Co-operative Society Ltd
Trichur (Kerala)

GOVERNMENT DEPARTMENTS AND ASSOCIATIONS CONTACTED DURING THE SURVEY

i. Organisations and Associations

State Trading Corporation of India Ltd
Express Building
Bahadur Shah Jafar Marg
New Delhi-1

Processed Foods Export Promotion Council
119 Jorbagh
New Delhi-3

National Co-operative Development Corporation
Ring Road
New Delhi

National Agricultural Co-operative Marketing Federation Ltd
E-11 Defence Colony
New Delhi-3

All India Food Preservers' Association
Niranjan Bangalow
Law College Road
Ahmedabad-6

Ahmedabad Co-operative Fruit & Vegetable Growers' Association Ltd
Bhagubhai Bande
Ahmedabad

Punjab State Marketing and Supply Federation
Sector 17-A
Chandigarh

Banana and Fruit Development Corporation Ltd
15 Pycraft Gardens Road
Madras-6

Andhra Pradesh Grape Growers' Association
Jhaheed-year-jang-lane
Basheer Bagh
Hyderabad

Limes and Vegetable Merchants Association
Vijayawada

ii. Research Institutions

Indian Agricultural Research Institute
New Delhi

Indian Council of Agricultural Research
Krishi Bhavan
New Delhi

Indian Standards Institution
Manak Bhavan
Bahadur Shah Jafar Marg
New Delhi-1

Central Food Technological Research Institute
Mysore

Chettilalli Fruit Research Station
Chettilalli

Experimental Research Station of CFTRI
Trichur
Kerala

Citrus Die-B-Research Station
Gonicoppal
Mysore

Vathur Farm Horticultural Station
Vathur (Coorg)

Fruit Research Station
Government of Madras
Kallal
Nilgiris

College of Agriculture
Coimbatore

University College of Agriculture
Rajinder Nagar
Hyderabad

Agricultural College
Poona

Indian Meteorological Department
Division of Agricultural Meteorology
Poona

Central Potato Research Institute
Simla

Regional Laboratory of CSIR
Fruit Preservation Division
Jammu

iii. Government Departments

Ministry of Commerce
(E.P. Agriculture Section)
Udyog Bhavan
New Delhi

Ministry of Agriculture
Department of Agriculture
Krishi Bhavan
New Delhi

Ministry of Industrial Development
Directorate General of Technical Development
Udyog Bhavan
New Delhi

Office of the Directorate of Marketing & Inspection
Government of India
Nagpur

Regional Office of the Directorate of Marketing & Inspection
Government of India
New Central Sectt. Office Building
(3rd Floor)
New Marine Lines
Bombay

Regional Office of the Directorate of Marketing & Inspection
Government of India
Shastri Bhavan
Nungambakkam
Madras

Regional Office of the Directorate of Marketing
& Inspection
Government of India
Lucknow

Department of Horticulture
Government of Gujarat
Krishi Bhavan
Ahmedabad

Office of Registrar of Co-operative Societies
Government of Gujarat
Mental Hospital Road
Ahmedabad

Department of Agriculture
(Horticulture)
Goa Administration
Panjim (Goa)

Directorate of Industries
Department of Commerce & Industry
Government of Jammu & Kashmir
Srinagar

Department of Agriculture
Government of Punjab
Chandigarh

Department of Food & Agriculture
Government of Punjab
Chandigarh

Department of Agriculture
(Horticulture)
Government of Haryana
Chandigarh

Department of Food & Agriculture
Government of Himachal Pradesh
Simla

Directorate of Agricultural Marketing
Government of Uttar Pradesh
Lucknow

Department of Agriculture
Government of Bihar
Patna

Department of Agriculture
(Horticulture)
Government of Bihar
Patna

Directorate of Agricultural Marketing
Government of West Bengal
Calcutta

Directorate of Agriculture
Government of Andhra Pradesh
Fateh Maidan Club
Hyderabad

Directorate of Marketing
Government of Andhra Pradesh
Station Road
Hyderabad-1

State Marketing Officer
Government of Madras
Madras

Department of Horticulture
Government of Madras
Madras

Department of Agriculture
(Horticulture)
Government of Mysore
Lal Bagh
Bangalore

Joint Chief Marketing Officer to the Government of Mysore
2 Ali Akbar Road
Bangalore

Bureau of Economics and Statistics
Government of Kerala
Trivandrum

Department of Agriculture
Government of Kerala
Trivandrum

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE
LIBRARY
22 1.22
MYSORE